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THE FACTORS THAT INFLUENCE THE PROGNOSIS IN FRACTURES AT THE BASE OF THE RADIUS.*

JAMES MORLEY HITZROT, M.D.,
AND CLAY RAY MURRAY, M.D.,
NEW YORK CITY.

Fractures at the lower end of the radius have attracted the attention of many writers, and Pilcher's[1] article on this injury is a classical exposition of the subject. Like Pilcher's contribution, most of the descriptions of the injury do not deal at any length with the factors which have to do with the prognosis, with this exception, that practically all the writers believe that a proper reduction is one of the factors essential to a satisfactory outcome.

For a number of years this problem has been attracting the attention of one of us (J. M. H.) and, in collaboration, we have endeavored to determine what factors influence the result. Before beginning our own investigation we obtained from the literature such opinions as related to this subject.

Stimson[2] mentions that some deformity, as a rule, results in adults, and that function may be somewhat restricted, especially movements in supination because of the infiltration of the pronator quadratus. He states that rigidity of the wrist and fingers may persist in the aged and rheumatic, and in those cases in which there has been much inflammation in the tendon sheaths and in the wrist joint.

Scudder states that the line of fracture may involve the lower radio-ulnar joint and he explains the delay in the return of movements in supination by this factor. He furthermore states that some widening of the wrist will remain after most Colles' fractures, and at the end of his paragraph states that the more nearly the deformity is corrected at the first setting, the milder will be the pain about the wrist.

Cotton believes that bad results "in so far as function goes" are the result of bad treatment rather than the injury. Further on he mentions weakness on the ulnar side of the wrist and limitation of flexion, limited adduction, etc., none of which does he consider as factors productive of any special trouble.

Dwight states that it was invariably the mildest cases, i. e., those without injuries to the soft parts and joints, that showed the quickest functional recovery, and that cases with considerable joint reaction required longer immobilization, but that their slower functional recovery was due not to the immobilization but to the conditions in the joints. He furthermore points out that a poor functional result may be laid to a severe injury. The use of anesthesia for the reduction gave a better anatomical result than when it was not used in his series.

Pilcher[1] states that in those cases of fracture at the base of the radius with appreciable displacement, some permanent deformity is unavoidable, i. e., the bone deformity is a result of the accident itself. Prominence of the head of the ulna with widening of the wrist and the loss of the anterior projecting tip of the radius and the more or less backward inclination upon the plane of the carpal articular surface of the radius are the most common permanent deformities resultinf from the fractures at the base of the radius. The chief sources of functional disability are the consequences of the peri-articular changes such as matting of the tendons, contracture of the ligaments, and the formation of fibrous bands and adhesions. Too prolonged immobilization and undue pressure of splints may aggravate the functional disability.

Darrach and Dwight[3] believe that the pain over the head of the ulna and the limitation of pronation and supination, and adduction which may follow Colles' fractures are due to derangements of the inferior radio-ulnar joint, particularly in those cases in which the level of the articular surfaces of the radius is changed by impaction. They believe that the above pain and disability may be largely corrected by proper reduction.

Estes[4] in the report of the commission on fractures appointed by the American Surgical Association calls attention to the importance of the anatomical result in fractures near a joint, the importance of immediate reduction, the use of anesthesia, and the relation of the age of the patient to the excellence of the functional result.

T. W. Huntington[5] states that the following factors should be considered in the prognosis of fractures: (1) the personal equation of the patient, such as age, personality, etc. (2) the bone lesion, i. e., the fracture line, its character, coexisting comminution, its rela-

*Read before the New York Physicians' Association in April, 1917, with lantern slide illustrations, but preparation for publication delayed by the war.

tion to a joint, and whether the lesion is single or multiple. (3) the injury to the soft parts. (4) the method of treatment used.

Troell [6] reports 117 cases which he followed from one to twelve months after the treatment was completed. Seven cases had no displacement, with a perfect anatomical result. The functional result was normal in four cases. There was some disability in one case. Two cases had rheumatism (pain?) and weakness of the hand.

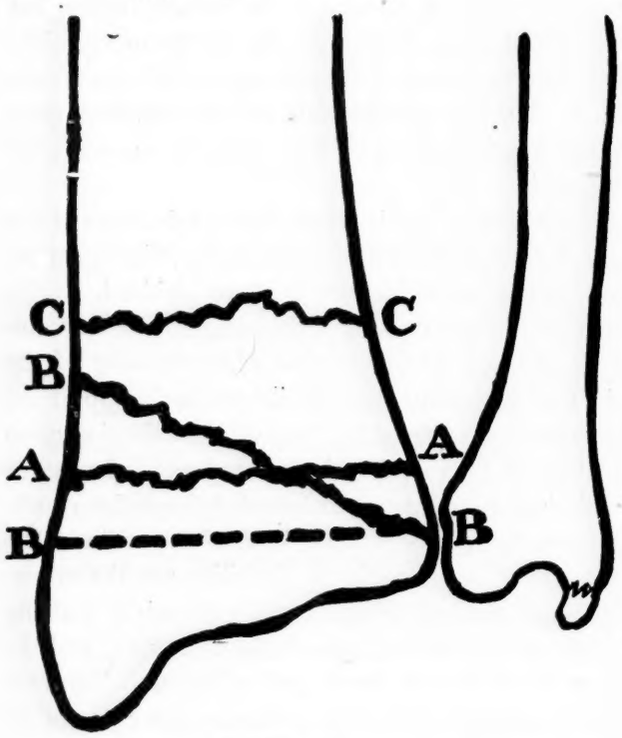


Figure 1.

In the cases with displacement:

Anatomical result:

No deformity 41
Good 9
Some deformity 11

Functional result:

Complete 30
More or less disturbance of function...40

Further in his paper he quotes a percentage estimation of his findings for the 117 cases as follows:

Anatomical result:

Satisfactory in 80%
Definite deformity 20%

Functional result:

Satisfactory 76%
Unsatisfactory 24%

Krantz[7] in an analysis of 300 cases treated by the Lexer method gives the following:

Full ability to work 92.7%
Some disability 2.7%
Great disability 1.8%
Some loss of supination 8.1%

The only deformity mentioned is radial deflection of the hand which was present in 13.6% cases.

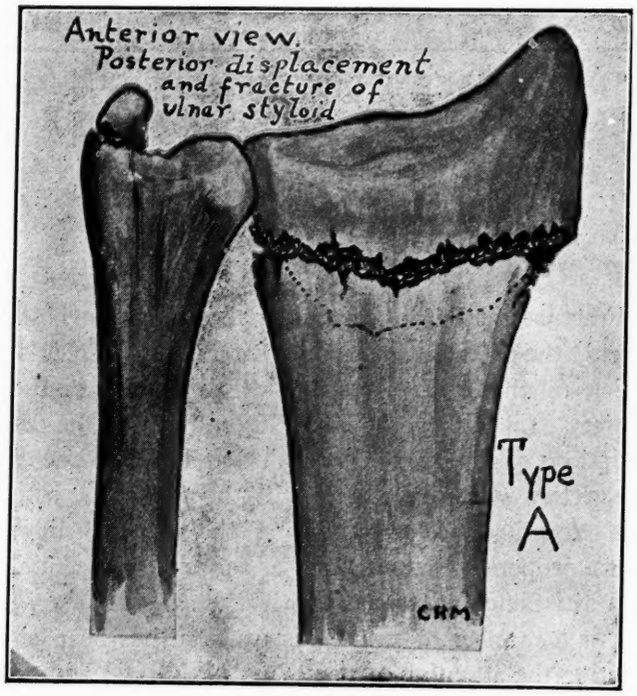


Figure 2.

Lexer[8] gives statistics for 110 cases treated by his method:

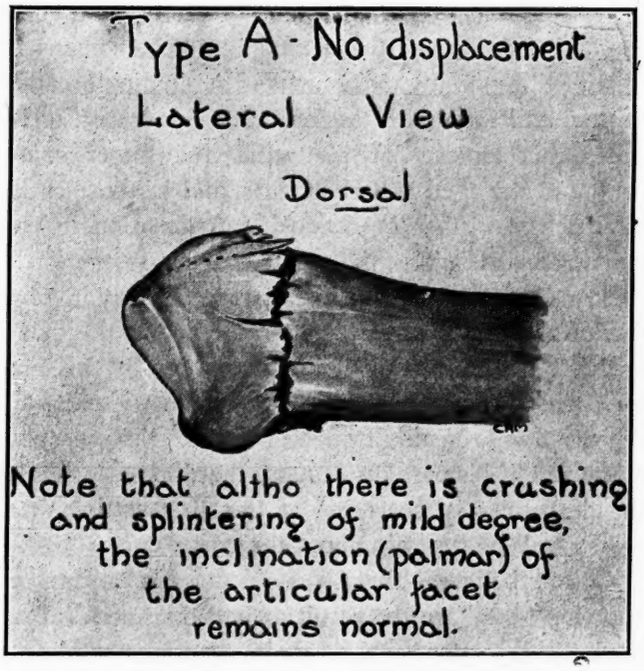


Figure 3.

Anatomical result:

Slight radial displacement 13.6%

Functional result:

Limitation of more than 5% in supination 18.1%

Limitation of flexion and extension.21.3%
Could not close the hand completely
(make a fist) 7.3%

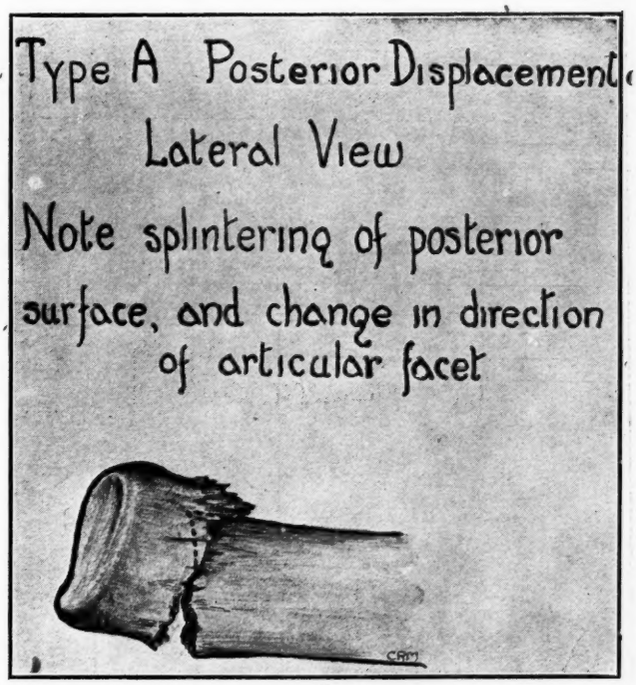


Figure 4.

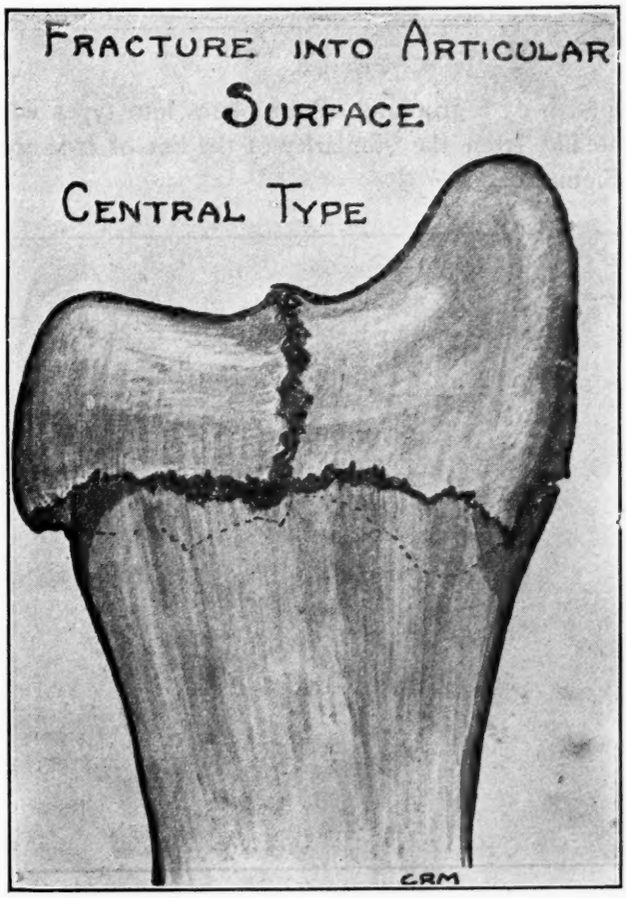


Figure 5.

The above, while by no means an exhaustive review of the literature, demonstrates quite clearly the absence of any standard conception for reporting the result of fractures at the base of the radius but from this mass of literature one can glean the fact that some anatomical deformity, some functional and industrial disability, are a very common result of fractures in the region under discussion.

In general, then, the factors that influence the prognosis in fractures at the base of the radius may be said to be:

1. The character and location of the line of fracture and the degree and variety of the displacement.
2. The reduction of the fracture, whether perfect,

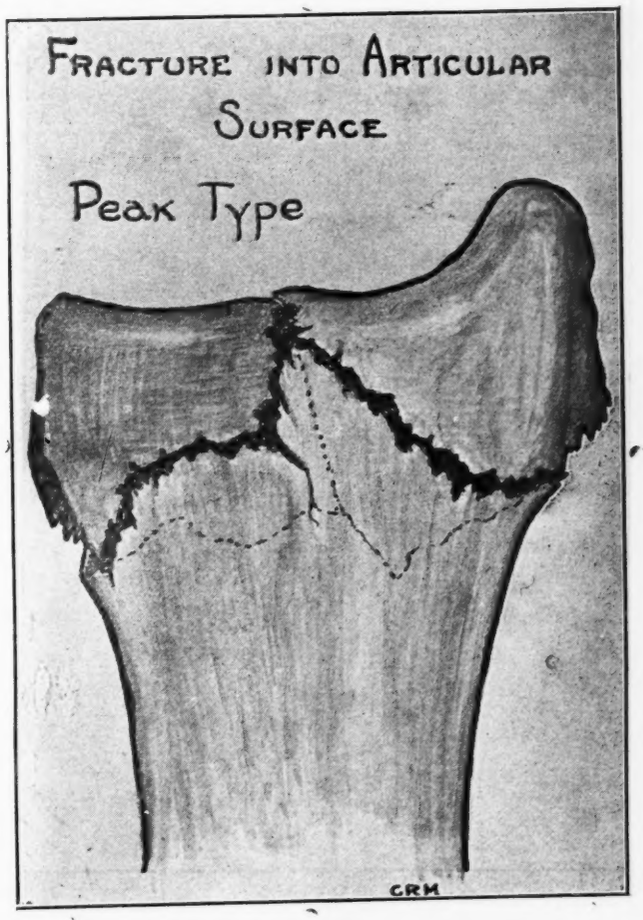


Figure 6.

complete, or imperfect or incomplete. The time of reduction. The use of anesthesia for reduction.

3. The treatment,—mobilization and immobilization, (type and length of), massage and baking.
4. The age of the patient.
5. The temperament of the patient.

The only element in the above five factors that influence the prognosis which seemed to us to be constant was the first-named. By that I (J. M. H.) mean that if we could determine the approximate number of times that any given line of fracture and displacement appeared in a series of routine cases, it would be possible to express at least an approximate

prognosis for similar types as determined by clinical analysis.

In this paper it is our purpose to submit the result of an analysis of: 1. A series of consecutive *x*-ray plates of fractures at the base of the radius taken from the files of the *x*-ray department of the New York Hospital; 2. An analysis of 130 clinical cases observed for more than one year for their cosmetic, functional and industrial result.

While the clinical cases bear no definite relationship

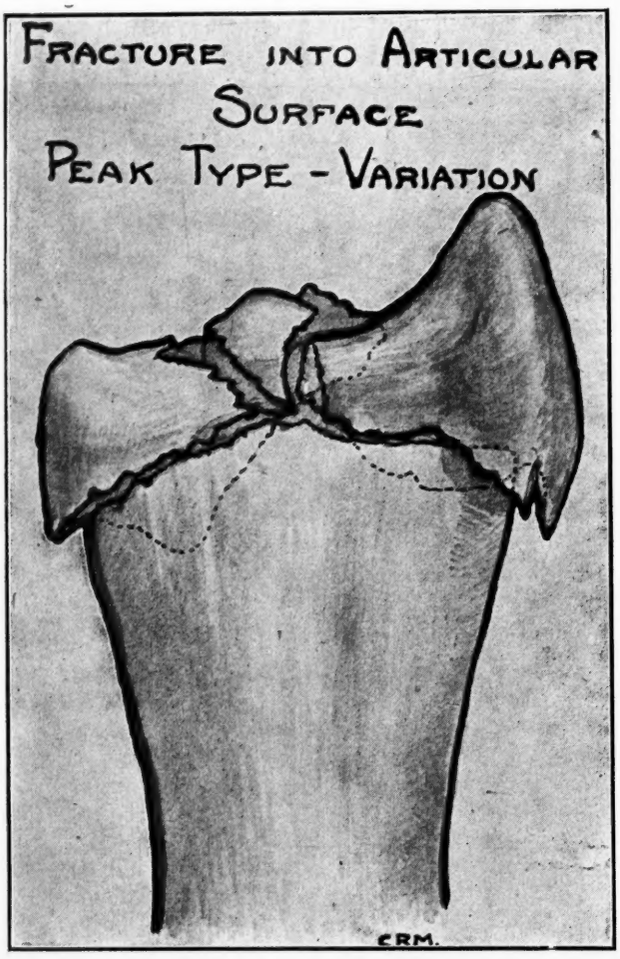


Figure 7.

to the *x*-ray series except in isolated instances, the *x*-ray plate of each clinical case was, after examination, placed under its appropriate type as classified in the type chart. Using the type chart as a basis, charts will be presented showing the result for each given type as determined by this analysis of a given series of clinical cases.

The *x*-ray plates of 213 consecutive cases taken from the *x*-ray department of the New York Hospital (January to December 31st 1916) were examined to determine the possibility of making a working classification of the routine types of fractures at the base of the radius.

When the plates of these fractures were inspected in rotation it soon became evident that the line of fracture was a constant factor for certain definite

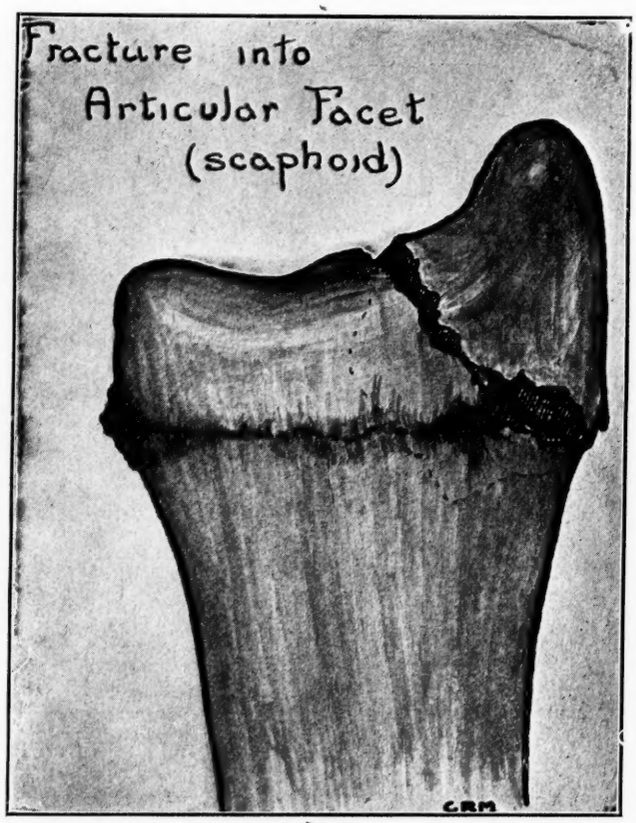


Figure 8.

types, i. e., a grouping of the plates into types was possible, from the similarity of the line of fracture. (Figure 1).

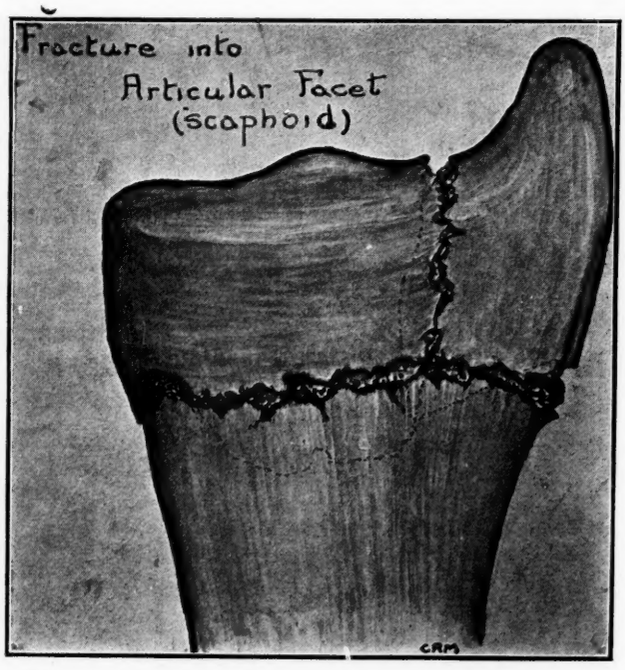


Figure 9.

For purposes of classification we have divided the recurring types into seven groups, namely: Types

A, B, C, Radial Styloid, Epiphyseal Separation, Longitudinal Split, Both Bones (1. at the level of Type A with posterior displacement of the carpal

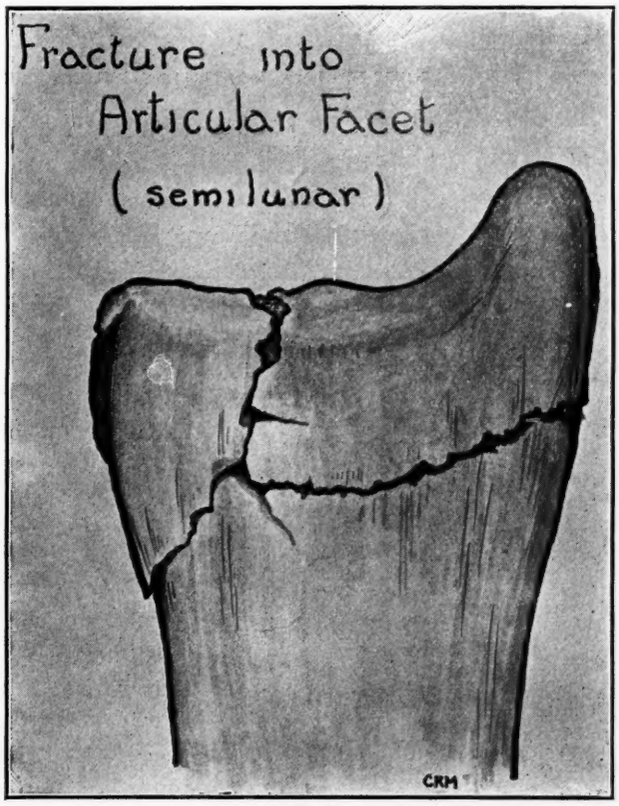


Figure 10.

fragments; 2. with anterior displacement of the carpal fragments, the so-called "reverse Colles").

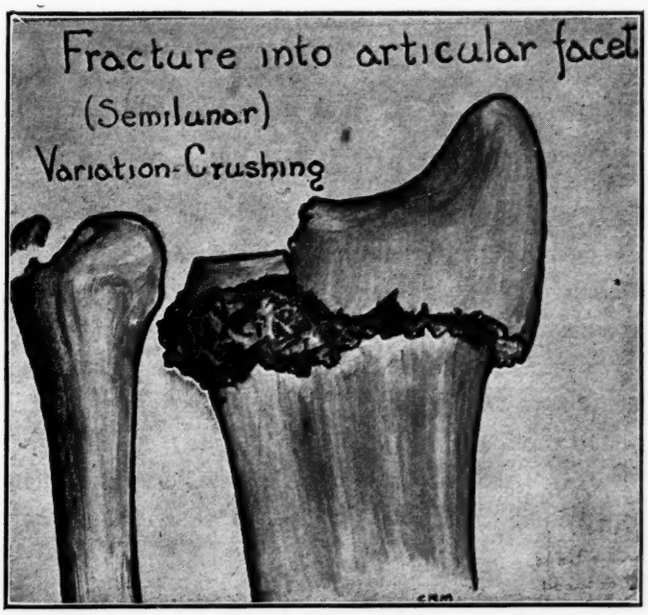


Figure 11.

(Undoubtedly there may be minor modifications and variations which will have to be added to this classification.)

Type A: (see Chart 1.)

Type A is characterized by a transverse line of fracture which begins 1.5 to 2 cm. above the tip of the radial styloid on the radial side of the bone, and ends just above, to 0.5 cm. above the inferior radio-ulnar joint on the ulnar side of the bone. (Figure 1)

This is the most common form in which fracture of the base of the radius occurs. There are 169 cases, 79 + %, in the series. Among these 169 cases the ulnar styloid was broken in 129 cases and in 40 cases it remained unbroken.

This type shows certain definitely recurring variations in the line of fracture, and in the degree and direction of the displacement of the fragments.

(1.) The most common form is that with posterior displacement of the lower fragment with the associated angular deformity at the line of fracture

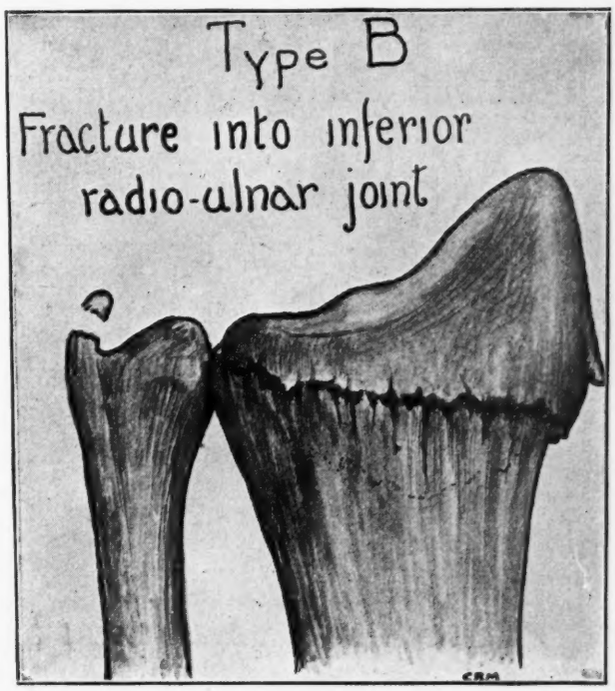


Figure 12.

and the accompanying change in the inclination of the radio-carpal articular facet of the radius. In this type there is commonly a moderate degree of splintering of the posterior surface of the lower fragment. In our series, 102 cases were of this type. In 76 the styloid process of the ulna was broken. In 26 cases the ulnar styloid was not broken. (Figures 2, 3, 4.)

2. The second variation most commonly found consists in a line of fracture which runs from the A-line through the articular surface of the radius, i. e., a line of fracture into the wrist-joint. This variation appears in five groups:

(a) A central line which passes at right angles from the A-line through the ridge between the articular facets for the scaphoid and semilunar, thus

forming two quadrilateral fragments. (Figure 5.)

(b) An irregular line of fracture which passes obliquely from the A-line into this dividing ridge and forms two roughly triangular fragments. To this one of us (Murray) has given the descriptive title of the "Peak Type." As a variation of this type the splintering off of this dividing ridge as a separate fragment may occur. (Figures 6 and 7.)

(c) A fracture line through the articular facet for the scaphoid which splits off a triangular fragment on the radial side. (Figures 8 and 9.)

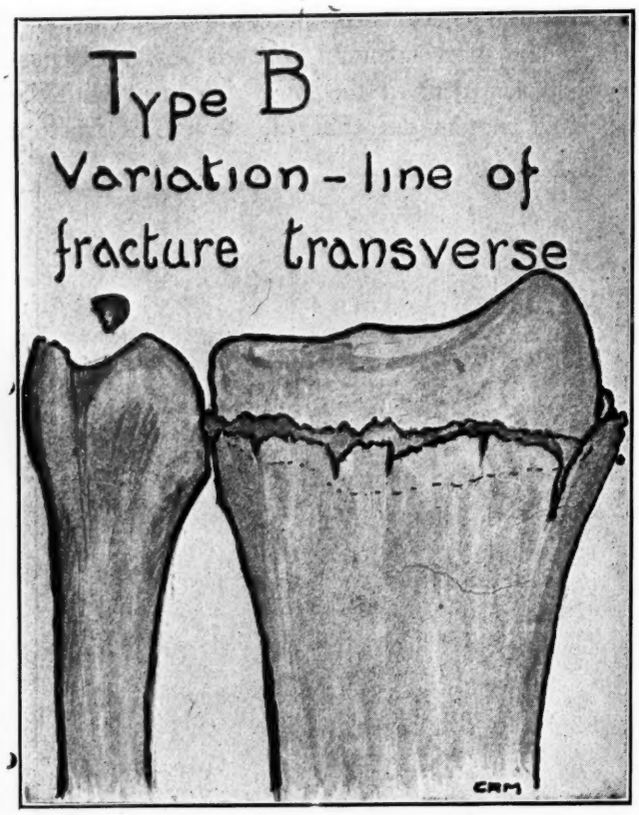


Figure 13.

(d) A fracture line through the articular facet for the semilunar which splits off a triangular fragment on the ulnar side of the base of the radius. (Figures 10 and 11.)

(e) In this group were placed two cases with severe crushing of the lower fragment which split it into numerous fragments with many lines of fracture involving the wrist joint.

The total number of cases of this variation in our series was 21, divided as follows:

(a) Central line	3	Styloid broken 3	
(b) Peak type	5	Styloid broken 5	
(c) Variation	2	Styloid broken 2	
(d) Scaphoid line	5	Styloid broken 5	
(e) Semilunar	4	Styloid broken 3	(Unbroken, 1)
(f) Complicated crushing	2	Styloid broken 2	
Total	21	20	1

3. The third most common variation was radial displacement of the lower fragment in addition to the common posterior one. This is characterized by the greater prominence of the head of the ulna, by marked radial deflection of the carpus, and by greater involvement of the radio-ulnar articulation.

In our series there were 15 cases of this variation, ulnar styloid broken in 9, unbroken in 6.

4. A fourth variation is due to the crushing of the lower fragment with varying degrees of splintering of that fragment and the penetration of the upper fragment into the lower. There is the usual posterior displacement, the angular deformity, and likewise some radial displacement of the lower fragment and the carpus. Due to this crushing and penetration, the radial styloid lies at a much higher level, the head of the ulna is much more prominent, and radial deflection of the carpus is constantly present.

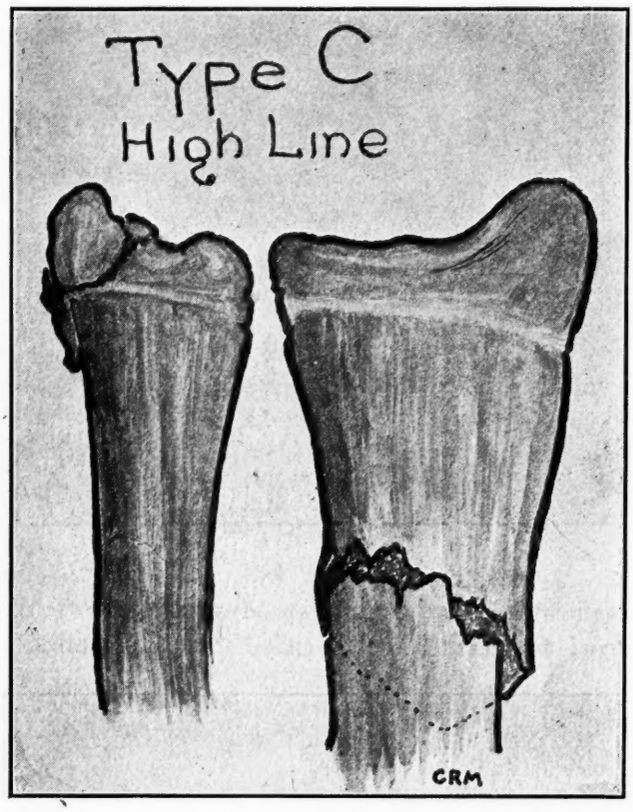


Figure 14.

In our series there were 12 cases of this variation, with 10 fractures of the ulnar styloid. In 2 cases the ulnar styloid was unbroken.

5. The fifth variation presents the common line, but no displacement is evident. The configuration of the bone and the inclination of the articular sur-

face are normal, and it is often difficult to demonstrate a line of fracture in the *x*-ray plate.

Of this variation there were 10 cases, with the ulnar styloid broken in 8, and unbroken in 2.

6. The sixth variation is a somewhat higher line of fracture through the radius, i. e., the line of fracture crosses the bones about 1.75 cm. to 2.5 cm. above the tip of the radial styloid. It shows the characteristic displacement with the altered inclination of the articular facet and some radial displacement. This type occurred in large-boned men, and the higher level may be explained by the size of the bone. Our series contained 9 cases of this variation, with fracture of the ulnar styloid in 6, and an unbroken styloid in 3 cases.

in adolescents before the fusion of the epiphysis with the diaphysis.

There was one adult case in this series, a woman.

The number of cases was 7, a percentage of 3.2 of this series:

Adolescents	6	Styloid broken	6
Adult,	1	" unbroken	1
	7		1

Epiphyseal separations occurred in 10 cases, or 4.7%, in this series. The ulnar styloid was broken in 7 of these and unbroken in 3.

Fracture of the radial styloid occurred 7 times, or 3.2%, in this series. In 6 cases there was a coincident fracture of the ulnar styloid.

Fracture of both bones at the wrist occurred twice. The radial fracture line crossed at the level of the A-line above described and the line of fracture in the ulna crossed that bone just above the ulnar head.

There were two cases, 0.9 + %, in this series. In one of these cases the lower fragments were displaced anteriorally.

One case, or 0.45%, in this series was a longitudinal split which began in the scaphoid facet of the radius and ran longitudinally up the shaft of the bone.

From the above *x*-ray analysis of the routine fractures Chart I has been prepared as a basis for computing the deformity, etc., as based upon the lines of fracture thus determined.

As has been stated, the above analysis of the *x*-ray plates was made to establish a "type chart," based upon the location of the line of fracture, the character and extent of that line of fracture, and such other factors, as the degree and character of displacement, as could be determined by the *x*-ray plate.

From the above analysis of a routine series of

CHART 1: TYPE CHART

Type	No. of Cases	Ulnar Styloid Broken	Ulnar Styloid Unbroken
A-type	169	129	40
B-type	17	10	7
C-type	7	6	1
Epiphyseal separations	10	7	3
Radial styloid	7	6	1
Both bones	2	0	2
Longitudinal split	1	0	1
TOTAL	213	162 (76%)	51 (23.9%)

	No. of Cases	Ulnar Styloid Broken	Ulnar Styloid Unbroken
A-line pure	102	76	26
Secondary line into wrist-joint	21	20	1
Radial displacement	15	9	6
A-line without displacement	10	8	2
Crushing	12	10	2
A-line high	9	6	3
TOTAL	169	129	40
Oblique line	14	10	4
Transverse line	3	0	3
TOTAL	17	10	7

Type B: (see Chart 1 and figure 1.) Figures 12 and 13.

Type B is characterized by a line of fracture which involves the inferior radio-ulnar joint. This line may begin at 2 to 2.5 cm. above the styloid on the radial side and pass obliquely into the joint, or it may be a transverse line crossing the bone at the level of the middle of the inferior radio-ulnar joint.

Our series contained 17 cases of this type (7.9%), divided into:

Oblique form,	14	—with fracture of ulnar styloid	10;	without 4
Transverse "	3	— " " " " "	3;	" 0
	17		13	4

Type C: (see Chart 1, figure 1 and figure 14.)

Type C is characterized by a higher line of fracture than either of the above, 3 to 3.75 cm. above the radial styloid, usually oblique and occurring chiefly

x-ray plates of fractures at the base of the radius it can be safely stated:

1. That there is a definite variation in the location of the line of fracture.

2. That this variation is sufficiently constant to classify the fracture into typical groups (viz. A, B, C, etc.).

3. That the common fracture is that described here under the "A" type.

4. That fracture of the styloid process of the ulna is more frequent than is ordinarily stated.

Taking as a basis for clinical analysis the above "type chart," it at once became evident that one should find a wide variation in the anatomical, functional, and industrial result of injuries due to the variation in the type and character of the bone injury.

To determine such a relationship between the character and location of the line of fracture and the anatomical and functional result, the clinical records of 130 clinical cases were submitted to critical analysis.

As has been stated, these clinical cases have no definite relationship to the *x*-ray series except in isolated instances. The *x*-ray plate of each case used to complete the "Deformity" and "Function" charts, which appear with this paper, was examined and placed under its appropriate type, so that the clinical series will and does give a very definite idea of the end-result for the given "type" of fracture under discussion.

All of the cases reported for analysis have been followed for over a year, and the existing result for the cases submitted to this analysis.

In compiling the "Deformity" and "Function" charts an attempt is made to show the effect of the age of the patient, the effect of the time of the reduction and the effect of the character of that reduction (whether complete or incomplete) upon the result obtained.

With slight exception this entire clinical series was submitted to exactly the same line of treatment, viz., reduction under nitrous oxide-oxygen anesthesia (ether in 10 cases; no anesthesia in 9 cases of type A without displacement); fixation by anterior and posterior moulded plaster splints, which allowed free movement of the fingers; movement of the fingers immediately after reduction insisted upon, massage begun as early as feasible and given during the first week either by the surgeon, or under his immediate supervision. Baking by dry heat begun within the first week after the injury.

The term "early" refers to cases reduced within six hours after injury, "late" refers to cases reduced 12 hours and upwards after the injury, "complete" refers to an exact anatomical replacement of the fragments (as determined by the *x*-ray); "incomplete" refers to a failure to completely replace the fragments along the line of fracture, or to a failure to correct the faulty inclination of the articular facet of the radius as determined by the *x*-ray.

To interpret these charts it is necessary to understand the normal range of motion of the region involved.

The normal range of motion at the wrist joint as ordinarily given is as follows:

Dorsal flexion	.....	50°
Palmar "	.....	55°
Radial "	.....	55°
Ulnar "	.....	30°

CHART 2: DEFORMITY CHART

Early Reductions (Complete)

Time of Reduction	Type of Fracture	No of Cases	Degree of Deformity: None	Slight	Moderate	Marked
Early complete ..	Pure A over 50 years	5		4	1	
	Pure A under 50 years.....	20		20		
	A-line with line into wrist-joint	0				
	A-line with radial displacement	2		1	1	
	A-line with marked crushing	0				
	A-line without displacement	10	2	8		
	A-line high	3	2	1		
	B-type	4		1	3	
	C-type	6	3	3		
	Epiphyseal separation	5	1	4		
	Radial styloid	3	1	2		
	Both bones	1		1		
	TOTAL	59	9	45	5	

Pronation } each way from the middle
supination } position .....90°

In the charts the functional condition is expressed in percentage terms, i. e., 100 in the supination column means complete supination or 90°, 50 in the supination column means 50% of 90°, or a limitation of that motion to one-half normal, or 45° of supination, etc.

The degree of function was obtained by having the motion of the patient's wrist recorded on paper as a segment of a circle and the segment thus obtained compared to a segment of a circle made by the same patient's normal wrist, and the difference obtained by calculating the per cent. difference between injured and normal segments.

In 59 cases of early complete reductions (see Chart 2) there was no determinable deformity in 9 cases. Analyzing these cases we find that two were "A line" fractures, with angulation before reduction, three were the "C type" in adolescents, 1 an epiphyseal separation; and one a fracture of the radial styloid. All were mild injuries.

There was a slight deformitory in 45 cases and a moderate deformity in five cases, i. e., there was a recognizable deformity in the vast majority of the cases.

The Functional Chart (Chart 3) shows the most marked disturbance for this group in the cases over 50 years of age, and also a greater delay in the return of function. The chart furthermore shows a greater functional disturbance in those types that produce the greater disturbance in the inferior radial ulnar joint (type B—and fracture of both bones).

CHART (3): FUNCTION CHART.

Early Reductions (Complete)

TYPE	No. of Cases.	Flexion	Extension	Supination	Pronation	Radial Adduction	Ulnar Abduction	PAIN	REMARKS
A-type over 50 years ...	5	50	50	50	50	50	50	In all	Slow return of function, weakness in grip.
A-type under 50 years. .	10	100	100	100	100	100	100	None	Complete function.
	2	95+	100	100	100	100	100	After use in 1 case.	
	5	100	100	95+	100	95+	95+	In region of ulnar head in 3 cases. Weakness in grip in 1. Cramp in hand after writing in 1 case.	
	3	100	100	100	100	95	95	In region of ulnar head. Cramp in hand after writing in 1 case.	
A-type with line into wrist-joint	0	..	..	..	..	..	..		
A-type with radial displacement	2	100	100	99	100	99	100	None	
A-type without displacement	10	100	100	100	100	100	100	In 2 cases pain over ulnar styloid.	
A-line high	3	100	100	99	99	100	100		
B-type	4	100	100	80–90	90–95	95	95	Pain over inferior radio-ulnar joint after use in supination or pronation.	
C-type	6	100	100	99–100	100	100	100		
Epiphyseal separations...	5	100	100	100	100	100	100		
Radial styloid	3	100	100	100	100	100	100		
Both bones	1	90–95	90–95	90	95	90	95	Pain over inferior radio-ulnar joint.	
TOTAL	59								

From the above we may conclude:

1. That some deformity is the common result even in mild injuries.

2. That disability is a common result for this type in elderly individuals.

3. That disability is most marked in supination and pronation, especially in those types that involve the inferior radio-ulnar joint.

In the analysis of the clinical series in this paper 30 cases were incomplete reductions submitted to

the same early reduction as carried out in the previous 59 cases (v. s.)

The character of the reduction obtained was determined by the *x*-ray and was not revised because it was so slight as to seem negligible, or because it did not seem susceptible of correction, or because it did not seem wise to attempt further manipulative correction.

In 10 of the cases there was failure to restore the normal anterior and posterior inclination of the articular facet of the radius, and in these there was a more marked deformity with a remnant of the "silver fork" deformity, that is, a deformity greater than existed in the above 10 cases.

From the above, therefore, it can be stated that deformity, i. e., some widening of the wrist joint,

CHART 4: DEFORMITY CHART

Early Reductions (Incomplete)

Time of Reduction	Type of Fracture	No of Cases	Degree of Deformity None	Slight	Moderate	Marked
Early incomplete	Pure A	10		1	9	
	A-line with line into wrist-joint	10		1	5	4
	A-line with radial displacement	0				
	A-line with crushing	5			1	4
	A-line without displacement	0				
	A-line high	0				
	B-type	0				
	Epiphyseal separations	1				1
	Radial styloid (ulnar styloid not completely reduced)	4		2	2	
	Both bones	0				
	TOTAL	30		4	17	9

Inspection of the Deformity Chart (Chart 4) shows that deformity was a constant factor, and that it was most marked in the severe injuries.

Further analysis of the 20 cases included in the first two groups in the chart shows that 10 were incomplete reductions at the line of fracture, i. e., the greater prominence of the head of the ulna, some radial deflection of the hand and, in the cases of failure to correct the faulty inclination of the articular facet of the radius, some remnant of the "silver fork" deformity were constantly found.

Examination of the Function Chart (Chart 5) of

CHART 5: FUNCTION CHART

Early Reductions (Incomplete)

TYPE	No. of Cases.	Flexion	Extension	Supination	Pronation	Radial Adduction	Ulnar Abduction	PAIN	REMARKS
Pure A	8	99	99	90–95	95–99	90–80	99–95		In inferior radio-ulnar joint after use.
	2	99	99	80–90	95	90			
A-line with line into wrist joint	5	70	70	60	95	80–90	80–90		Pain and stiffness in the morning in 1 case.
	5	40	60	40	60	50	80		
A-line with marked crushing	5	50	60	50	75	50	75	After use	Pain and insecurity in wrist especially in supination.
Epiphyseal separations	1	95	95	99	100	100	100		
Radial styloid	4	99	100	100	100	90	95	Pain in 3	
TOTAL	30								

articular facet of the radius was at the correct inclination, but there was a failure to completely overcome either the posterior or some other displacement, and in two of the cases the fractured ulnar styloid was not placed in complete contact with the line of fracture on the head of the ulna.

the early incomplete reductions, shows a constant disturbance of function most marked for the severe bone injuries, with constant presence of pain, except in the case of epiphyseal separation. The function most markedly interferred with was supination. Failure to correct the faulty inclination of the artic-

ular facet of the radius produced a greater disturbance in flexion than was present in correct position of that facet.

From the above one may then state:

1. That when the bone injury is such that it prevents the complete reduction of the fracture or when the reduction is incomplete for other reasons, deformity is more marked and the disturbance of function is greater than in the early complete reductions; or, to state it in other terms, there is more deformity and disturbance in severe injuries and more deformity and disability in the milder injuries not completely corrected by the treatment.

The term late reduction applies to cases submitted to reduction after six hours, with an average delay between 12 and 24 hours.

In this series there are 41 cases, of which 13 may be classified as complete and 28 as incomplete reductions.

The 13 cases of complete reductions were cases of less severe injury, and less marked displacement than those recorded as incomplete.

Analyzing the charts (Nos. 6 and 7) one finds deformity present in all.

CHART 6: DEFORMITY CHART

Late Reductions (Complete)

Time of Reduction	Type of Fracture	No of Cases	Degree of Deformity None	Slight	Moderate	Marked
Late Complete .	Pure A over 50 years	5		1	2	2
	A-line with line into wrist-joint	0				
	A-line with radial displacement	3			1	2
	A-line without displacement	0				
	A-line with marked crushing	0				
	A-line high	0				
	B-type	0				
	C-type	1		1		
	Epiphyseal separations	3		1	1	1
	Radial styloid	0				
	Both bones	1			1	
	TOTAL	13		3	5	5

CHART 7: FUNCTION CHART

Late Reductions (Complete)

TYPE	No. of Cases.	Flexion	Extension	Supination	Pronation	Radial Adduction	Ulnar Abduction	PAIN	REMARKS
A-type pure over 50 years	3	50	50	20–30 50	50	50	50	In all	Very slow return of function. Weakness in grip. Stiffness in the morning.
	2	5	5	0	0	0	0	In all	Complete disability. Arthritis of the wrist. Atrophy of the hand, etc.
A-type with radial displacement ...	3	100	100	90	99	100	95	In all	Over radio-ulnar joint.
C-type	1	100	100	99	100	100	100		
Epiphyseal separations	3	100	100	95–100	100	100	100	None	Disturbance in growth in radius in 2 cases.
Both bones (reverse displacement) ..	1	95	99	95	100	100	100	None	Reduced by open operation.
TOTAL	13								

In the Function Chart one finds the most marked disability in the patients over 50 years of age, two of whom had practically a complete disability. Pain was a practically constant factor except in the four

last cases in the chart. In two of the epiphyseal separations there was a definite disturbance in the growth of the radius, which became evident at the six months interval, but did not increase beyond that observed at that time.

One may, therefore, conclude that late reductions for a similar type of anatomical lesion will result in more deformity and in greater functional disturbance, and that all the above are more marked in the older individuals.

Analyzing the chart of the 28 cases of late incomplete reductions, one finds the cases of more severe bone injury with the more complicated forms of bone injury (Charts 8, 9.)

The deformity chart shows a large preponderance under the column "marked" deformity.

Analysis of the Function Chart shows a greater disturbance of function than occurs in the other groups, except for the two cases of complete disability in charts 6 and 7, and a greater and more varied degree of complaints.

Pain is a constant factor and is more marked in the severe injuries. Functional return is slower, and in general is much less than for similar injuries reduced earlier.

One may conclude, therefore, that late incomplete reductions result in more deformity, greater disturbance in function, and a more varied degree of complaints about the disability than occur in the other groups.

From all the above one may conclude (under exactly similar conditions of treatment):

1. That fractures at the base of the radius may be separated into definite groups, dependent upon

CHART 8: DEFORMITY CHART

Late Reductions (Incomplete)

Time of Reduction	Type of Fracture	No of Cases	Degree of Deformity None	Slight	Moderate	Marked
Late incomplete	Pure A	10			2	8
	A-line with line into wrist-joint	10			5	5
	A-line with radial displacement	0				
	A-line with crushing	5				5
	A-line without displacement	0				
	A-line high	0				
	B-type	1				1
	C-type	1				1
	Epiphyseal separations	1				1
	Radial styloid	0				
	Both bones	0				
	TOTAL	28			7	21

CHART 9: FUNCTION CHART

Late Reductions (Incomplete)

Type	No. of Cases.	Flexion	Extension	Supination	Pronation	Radial Adduction	Ulnar Abduction	PAIN	REMARKS
A-type pure inclination of articulation.	2 8	80–60 70	100 *	95–90	99–99	100–90 99	100–99 100	Pain after use	Slow return of function.
A-type with line into wrist-joint	10	25	25	50–60	95–99	10	25	Pain after use	Stiffness and insecurity in movements putting strain at wrist.
A-line with marked crushing.	5	25–50	50–60	25–50	50	10–20	25–50	Pain in all	Many complaints as to disability.
B-type	1	80	90	50	90	99	99	Pain on supination	
C-type	1	100	100	95	90	100	100	?	Weakness in supination.
Epiphyseal separations	1	99	99	99	99	99	80	?	Lack of growth (?)
TOTAL	28	*More than normal							

the location of the line of fracture as determined by the *x*-ray.

2. That deformity and disturbance of function are less marked in the mild injuries and more marked in the more severe injuries.

3. That the earlier the reductions for similar types the better the cosmetic and the functional result.

4. That the more complete the anatomical restoration, the less the deformity and the less the disturbance of function for similar types of bone injury.

5. That age has a definite effect upon the prognosis, and that similar bone injuries produce more disability over 50.

(The writers beg to acknowledge their indebtedness to Doctor Busby, the roentologist at the New York Hospital, for the courtesies extended them in his department.)

REFERENCES

1 Pilcher: Fractures of the Lower Extremity or Base of the Radius, Annals of Surgery, Jan., 1917, LXV., No. 1, pp. 1-27.
2 Stimson: Fractures and Dislocations, Lea & Febiger, 1912.
3 Darrach and Dwight: Medical Record, N. Y., 1915, XXXVIII., p. 708.
4 Estes: Trans. Amer. Med. Assn., Phila., 1915, XXXIII., p. 773.
5 T. W. Huntington: Trans. Amer. Med. Assn., Phila., 1915, XXXIII., p. 715.
6 Troell: Arch. f. klin. Chir. Bd. CI., 1913, s.511.
7 Krantz: Deutsch. Zeit. f. Chir., Bd. CXVI., s.191.
8 Lexer: Verhandl. d. Deutsch. Gesellsch. f. Chir., 1906; Muench. Med. Woch., 1909, s.596.

PAINFUL AND DISABLED SHOULDERS.

A. WIESE HAMMER, M.D.,
PHILADELPHIA, PA.
Surgeon to the American Hospital for Diseases of the Stomach; Instructor in Anatomy, Graduate School of Medicine University of Pennsylvania, Polyclinic Section; Surgeon to the Pennsylvania Railroad.

There are many affections and conditions, coming under observation of the physician and surgeon, which may produce disability in the shoulder, either transient or permanent; for the most part, however, the pains suffered in this region are of little clinical worth, for their existence is dependent upon a lesion more or less remote, and the inconvenience suffered is usually the expression of reflected pain.

In this category it is interesting to call attention to the disability and pain attendant upon a number of medical entities, that cause the patient discomfort in the scapular region. We therefore mention neuritis, cervo-brachial neuralgia, diaphragmatic pleurisy, dilated stomach, duodenitis; and, especially when occurring in the right shoulder, aortic disease, hepatic disease, gall-stone colic, aneurism of the innominate artery, etc.

This phenomenon, i. e., painful shoulder, may readily be explained in each particular instance, and in illustration of this assertion we need but consider the pathological condition present in aneurism, wherein the spinal nerves become incorporated in the aneurismal sac, pain being referred to the back and to the left scapular region. In some hepatic diseases and in some instances of diseases of the gall-bladder and of the bile ducts, the occurrence of severe pain in the right shoulder finds a logical explanation in the transmission of irritation from branches of the phrenic nerve in the capsule of the liver and in the suspensory ligament to the fourth cervical nerve, which also receives branches from the shoulder.

Omitting consideration of the many varieties of fracture in the vicinity of the shoulder-joint, such as fracture of the clavicle, scapula, etc., we are confronted with a number of surgical conditions, any one of which is capable of causing marked shoulder disability, and each of which demands careful differentiation in arriving at a correct diagnosis. In this category we tabulate; sprain, subacromial bursitis, fracture of the tuberosity and of the anatomical and surgical neck of the humerus, inflammation of the sheath of the biceps tendon, paralysis of the circumflex nerve, chronic arthritis, tuberculosis of the head of the humerus, and acromioclavicular arthritis.

In the differentiation of these conditions, we must take cognizance of what, in too many instances, is regarded as a simple affection, but which a close and careful examination proves to be a condition demanding attention of the most painstaking kind. We refer to a sprain of the shoulder-joint.

Sprains of the shoulder are peculiar in character and are frequently most troublesome affections. The initial symptoms are often misleading. The patient admits a certain stiffness in the execution of familiar movements, and a forcing of the joint causes some pain. The articulation may remain stiff and painful, or it may be mobile, with the occurrence of severe pain upon attempted movement. Anatomically, differentiation from synovitis and bursitis becomes either a skilled surgical accomplishment or an almost impossible diagnostic feat, for detection of sprain of the shoulder offers almost insuperable difficulties in an effort to isolate it from pure synovitis, tenosynovitis, bursitis, periarthritis, and severe injury to the capsular ligament; any or all of these conditions it may readily embrace.

It behooves us, therefore, to take a rapid survey of the anatomical peculiarities of the shoulder-joint, especially a brief consideration of the subacromial bursa, for the occurrence of sprains and subacromial bursitis are accidents of considerable frequency.*

*James K. Young, Subacromial Bursitis, *The Therapeutic Gazette*, January 15, 1917.

The subacromial bursa is the largest bursa about the shoulder-joint. Its upper portion is intimately united to the top of the tuberosity of the humerus; its base is firmly attached to the underside of the acromion and the coracobrachial ligament. The loose periphery of the bursa is movable, and, rolling on itself, permits the roof to slide to the base. While the size of the bursa may vary, it may be regarded as about 2½ inches in diameter. The bursa seldom communicates with the joint. When diseased, abduction and upward pressure cause much pain, because the sac is pinched between the head of the humerus, and the lower surface of the acromion and the coracoacromial ligament.

In considering subacromial bursitis, the main facts to be borne in mind are, besides the localized tenderness and swelling of the tip of the shoulder just below the acromion process, the limitation of both abduction and external rotation (v. supra); the scapula is locked by spasm, arm movement being accomplished by restricted rotation of the humeral head in the glenoid cavity, about 10° of an arc of a circle, being all that can be accomplished. There is pain over the point of the shoulder sometimes extending down into the hand, at other times referred to the point of insertion of the deltoid. At times, inflammation of the bursa may be detected by means of the *x*-rays; that ready demonstration can be made of the existence of calcareous deposits beneath the bursa, and at or beneath the attachment of the supraspinatus muscle, is a well-known surgical fact.

Fractures of the tuberosity and of the anatomical and surgical neck of the humerus are always responsible for painful and disabled shoulder-joints. They are accompanied by ecchymoses and swelling on the inner side of the arm. Fracture of the lesser tuberosity of the humerus, is occasioned by the same accident as produces injury to the subacromial bursa, i. e., by falling on the fully extended hand. The diagnosis of fracture of the lesser tuberosity, reveals tenderness over the seat of fracture and later by ecchymosis extended down the tendon of the biceps to the elbow. Of course, diagnosis in such instances is readily demonstrable by the *x*-rays.

Inflammation of the sheath of the biceps tendon is manifested by pain along the course of the long head of the biceps, the abductors and the external rotator muscles of the arm. Pain at the beginning of abduction suggests inflammation of the sheath of this tendon, the pain in abducting the arm in instances of subacromial bursitis, as heretofore mentioned, being limited to about 10 degrees. Paralysis of the circumflex nerve is often incorrectly diagnosed as subacromial bursitis or even as fracture of the lesser tuberosity of the humerus. In circumflex paralysis there is marked atrophy of the surrounding structures, inability to raise the arm; the paralysis can be verified by electrical tests. When the arm cannot be directly elevated, i. e., brought at right angles to the trunk, and later, when an appreciable space may be demonstrated between the humeral head and the acromion, it is evidence of the paralysis of the deltoid, whose nerve supply is the circumflex. When the outward rotation of the humerus is impaired, with excessive internal rotation, the infraspinatus muscle (the important external rotator muscle of the humerus) and the teres minor muscle are paralyzed; the former is supplied by the suprascapular nerve, the latter by the circumflex.

To attempt to dwell even in a cursory manner upon the subject of chronic arthritis would be impossible in an article of limited scope. Under this term are included a series of chronic degenerative changes, occurring at any age, mono- or poly-articular, impairing function to a greater or lesser degree, with more or less joint changes, and, in some instances, entailing great suffering. Any joint is likely to be attacked. Traumatism is a prominent factor in many instances. Infections may be the starting point of the articular invasion. At times, the deposit of urates at or within the joint eventually leads to joint disorganization. It is to be remembered that cartilage has a very limited power of repair, so that a common sequence of cartilage invasion is erosion. The original change in the joint may have its genesis in the synovial membrane, and it must not be forgotten that destruction of the articular cartilage may be secondary to the injury of the synovial membrane. Surgical writers classify these anatomic lesions of the joints as serous, ulcerative, ankylosing, formative and fungous.

The most common variety of chronic arthritis in the shoulder, however, is the traumatic; the result of injury in an individual suffering from an underlying infectious or toxic condition. In these cases there is tenderness over the great tuberosity and also in the axilla, some induration about the articulation, impairment of mobility, and the presence of crepitus.

The subject of shoulder disability is an interesting one and has attracted the attention and commanded much investigation and study from some of the best thinkers in the field of surgery. The labors of Codman and of Brickner are especially conspicuous in this connection, and for a concise and succinct presentation of the clinical forms of subacromial bursi-

tis, we quote from one of Brickner's excellent articles* the following paragraphs:

"Codman's classification into three types, 'acute or spasmodic, subacute or adherent and chronic or non-adherent,' is unsatisfactory from the anatomic side, for in all cases, acute or chronic, the pathology is, I believe, the same—an adhesive bursitis. We cannot recognize, therefore, a non-adherent and an adherent type, nor it seems to me, can we make a satisfactory distinction under the titles 'subacute' and 'chronic'.

"In my experience the cases present themselves in the following forms which, however, are not to be sharply separated: acute, 'hyperacute', chronic, chronic with exacerbations.

"In acute cases, pain and stiffness develop rapidly and reach a maximum in about three days. The pain is quite severe and constant, and subsides little or not at all at night. The arm can be only slightly abducted without great pain. There is spasm of the shoulder muscles, increased by attempted abduction or internal rotation, active or passive.

"The term 'hyperacute' I use to indicate not so much the rapid development of the symptoms as their severity. The pain is very great. The patient hugs his arm to his chest, and the slightest attempt to raise it causes severe spasm. There is a rapid development of atrophy of the deltoideus and the spinati. Radiation of the pain into the fingers, with this atrophy, may deceive even a neurologist into the diagnosis of brachial neuritis. Indeed, the early appearance of atrophy of these three muscles suggests that there may be some associated localized neuritis; disuse for a short period seems not quite sufficient to explain it.

"In both the acute and the 'hyperacute' forms, tenderness at the point I have described is exquisite.

"Acute subdeltoid bursitis may gradually subside completely. More often it passes into the chronic form.

"Chronic subdeltoid bursitis begins in the acute form, or is of the same severity throughout. The pain is often annoying rather than unendurable. It may be quite intermittent, varying in severity. Often it is present only on certain motions (as in pulling on an overcoat sleeve, or attempting to comb the hair). Abduction may be limited to 45, 90, or 130 degrees; internal rotation may be much or little retarded. Passive movements are usually a little freer than active. External rotation is sometimes limited. In many cases the movements are perfect, but usually they are then more or less painful. Tenderness on pressure over the lesser tuberosity is usually present and often great. There may or may not be atrophy of the deltoideus and spinati.

"This chronic form persists for months or years. Usually it subsides, with or without treatment, sometimes in spite of certain treatments. The lime deposit, if there is one, may gradually disappear completely.

"The 'chronic form with exacerbations' is of those cases, lasting for years, in which there is often a recession of symptoms, more or less complete, for long periods, but in which every few weeks or few months there is a severe exacerbation in which the symptoms approach those of the acute or even the 'hyperacute' form."

There is often considerable difficulty in instances of painful and disabled shoulders, in differentiating tuberculosis of the head of the humerus, from subacromial bursitis and allied conditions. For, in many cases of bursitis, not infrequently the diseased bursa reveals the presence of tubercle bacillus. Early in the tubercular infection there is localized pain over the head of the bone, loss of rotundity of the shoulder caused by flattening of the deltoid and fixation of the joint—due to muscular spasm and to the occurrence of ankylosis. There is always a primary lesion in some other part of the body. Abscess formation is a later expression of tubercular involvement. The employment of the *x*-rays as a corroborative measure is imperatively demanded.

Acromio-clavicular arthritis is difficult of diagnosis where ankylosis has formed and has been broken by traumatism. The *x*-rays furnishes the only sure means of arriving at a correct diagnosis.

It has been the desire of the writer to touch only superficially upon the surgical aspects of this important subject in so far as the more prominent surgical affections are responsible for the existence of painful and disabled shoulders.

On this account and in order to keep the subject matter within bounds and to present the dominant features succinctly, the writer has purposely omitted from consideration such arthritic conditions as are produced through toxins of many diseases. In this class we may include what may be broadly termed the many forms of infective arthritis: gonorrheal arthritis, influenzal arthritis, pneumococcic and typhoid arthritis. In this category may be scheduled rheumatic synovitis, commonly designated as "acute articular rheumatism" or as "acute rheumatic fever." The subject of arthritis deformans forms a separate chapter in itself.

218 SOUTH FIFTEENTH STREET.

*W. M. Brickner, Pain in the Arm: Subdeltoid (Subacromial) Bursitis, *Journal of the Amer. Med. Assn.*, Vol. LXIX., October 13, 1917.

RADIUM IN THE TREATMENT OF SARCOMA AND CARCINOMA OF THE BONE*

WILLIAM NEILL, JR., A.B., M.D.,
BALTIMORE, MD.

One of the worst things a surgeon sees is a true central or subperiosteal sarcoma of the bone. It appears so small and easy to remove, and yet from the first the outlook is bad. The possibilities of an operative permanent cure are so remote that one should not perform a radical operation until every means of a definite diagnosis have been exhausted, in order not to remove an arm or a leg for a benign tumor—as has been repeatedly done. For example, not many years ago, one of our eminent surgeons was prepared to operate upon a patient for a round-cell sarcoma of the thigh, when the patient decamped; he is alive and well to-day, the tumor later having been simply opened and drained. Up to the present time but four per cent. of cures have been reported following the radical operation, the common cause of death being metastasis to the lungs, and not a local recurrence. This raises the question of the importance of careful *x*-ray examination of the lungs and mediastinum in every instance before an operation, which I earnestly recommend, even in early cases, as the metastasis also takes place early. *X*-ray examinations of other bones of the skeleton should also be made, as the lesion may be metastatic, in spite of the fact that but one bone presents macroscopic signs of involvement.

For the past several years, but especially during the last year, we have tested out the efficacy of radium in sundry sarcomas of the bone, and in consequence, I am glad to say, we can now hold out a little hope, and certainly a greater one than when operation alone is resorted to. We have found that radium will sometimes destroy the disease and allow a new formation of healthy callus. The number of cases under observation and treatment is too small to cite percentages, but they are at least suggestive and lead us to hope for greater success in the near future as we continue to develop a more effective technique.

Three methods of treatment with radium which we have followed are: First, implantation or burying of radium emanation directly into the disease (from 1 to 3 millicuries) contained in minute glass capillary tubes, which are left permanently embedded. Second, massive treatments from the surface at a variable distance of from one to four inches with from one to four grams of radium. Third, laying bare the diseased tissue by operation and inserting, under inspection, a large amount of radium into the tumor, while the patient is under the anesthesia. Only with large amounts of radium can this last method be followed. The first method seems to be the most destructive to the local disease, and the most effective. Like the second, it is painless, it causes no severe reaction, and does not necessitate the patient's detention in the hospital, as in the open wound plan. Sometimes the three methods of treatment have been combined.

*From the Howard A. Kelly Hospital.

The approximate dosage for the needles, points, or spicules, as they are called, containing emanation, is 2 millicuries of emanation for each 4 cubic centimeters of disease for implantation; 5 gram-hours at 2 inches distance for each 3 square inches of surface, when treated from the exterior; one-half gram-hour direct treatment when placed under inspection in the center of the disease.

In almost every case we are fortunate enough to secure complete or partial relief of pain; this is the most striking result, and we feel that this alone well repays all our efforts. There is also a marked decrease in the swelling of the soft parts with increased function, a general improvement in health, and by *x*-ray examination, a redeposition of new bone. This change takes place in an interval of from two to five weeks.

The following cases are examples of the three methods:

F. J., married, white, lumberman, No. 6020, was first seen March 21, 1920, complaining of pain and swelling in his left shoulder, which had been injured by a fall four years before. This was followed by pain and stiffness, never severe, until the fall of 1919, when the pain became worse, and in November he had to stop work. There was marked swelling of the soft parts around the left shoulder and upper arm, but no reddening of the skin, the head of the humerus could not be felt, there was marked limitation of motion and the tumor felt solid. *X*-ray examination showed involvement of the whole of the head and upper third of the shaft of the humerus. The Wassermann reaction was negative. He suffered also from marked weakness and loss of weight. Radium was advised, and used, and three spicules, each containing 5 millicuries of emanation, were implanted at equal distances, about 4 centimeters apart, into the involved bone. In addition to this a total of 15 gram-hours radiation was given through the surface at 5 centimeters distance over three areas. In May, 1920, we noted a decided decrease in the swelling, and the pain was so greatly improved that he no longer had to resort to narcotics. Four more points, each containing 3 millicuries of emanation, this time were implanted as before. In July, 1920, another treatment was given entirely from the surface, using 15 gram-hours at 5 centimeters distance over three areas. In Sep-

tember, 1920, a total of 11 millicuries of emanation, contained in four points, was implanted. By this time all the local swelling had gone, and the head of the bone could easily be felt, and mobility was greatly improved. He had been comfortable for the preceding three months, requiring no sedatives at all. An *x*-ray plate taken at this stage shows a definite deposit of new bone throughout the area of disease. general health has not improved pari passu with the local condition, which leads us to fear metastases, although we have been unable to demonstrate any by examination or *x*-ray plates.

I have been unable to get a report from this patient since November 1, 1920. At that time there had been no decided change in his general condition, but he had been quite free from pain.

M. G., female, white, married, age 57, No. 6494, was first seen June 18, 1920, complaining of pain in her back and paralysis of her legs. *X*-ray examination showed a destructive bone lesion of the eleventh and twelfth spinal vertebrae and areas of destruction on the fifth, sixth and ninth ribs on the right side. In 1900, she had an operaiton for chronic mastitis of the left breast. In June, 1919, she was operated upon for carcinoma of the right breast, and was free from all trouble until January, 1920, when she began having severe pain in the lumbar region, which was increased when she attempted to get up or move about in bed. She had been totally bed-ridden, and had lost practically the entire use of her legs for the past six months. She was treated with radium at regular intervals from June 20th to July 19, 1920, from 3 to 3½ grams of radium being used. The treatments were all given at a distance through the mattress of the bed with the patient lying on her back. as she was unable to sit up or lie on her side on account of pain. She was again treated daily in a similar manner from September 18th to September 21, 1920. When examined this time, she was found to be entirely free from pain, and the muscular power of the legs showed great improvement, but she could not stand alone. Her general health was excellent. *X*-ray examination showed a definite filling in of callus in the lone lesion on the two vertebrae. A plaster jacket to support the spine was made, after which she was able to be out of bed and to walk with assistance. She returned December 1, 1920, still wearing the jacket. Her general health is excellnt and she can walk a mile. No pain. *X*-ray examination shows the vertebrae apparently solid, and no areas of erosion can be seen. The jacket has been discarded, and she will wear steel supports embedded in the corset.

C. C., female, white, age 16, No. 4175, was first seen June 28, 1918, complaining of pain and swelling in the right knee. She had a fall in 1916, which was followed two months later with pain on motion of the right knee joint. She was treated for rheumatism, but the pain and limitation of motion increased, and a definte swelling developed in the soft parts. An *x*-ray diagnosis of sarcoma of the lower end of the right femur was made. The Wassermann reaction was negative. In Ferbuary, 1917 an open operation was performed and a thorough curettage done, after which she wore a cast for eight weeks. The pathological diagnosis was giant-cell sarcoma. There was a definite recurrence in the fall of 1917, and a second operation was performed, similar to the first. She was fairly free from symptoms following this operation until May, 1918, when there was evidence of a definite recurrence. When first seen in June, 1918, there was considerable enlargment of the right knee, the bony prominences were obscured and there was marked limitation of motion, with increased pain. There are scars of the previous operations, but no reddening of the skin. *X*-ray examination showed involvement of both condyles of the femur and the adjacent shaft of bone. Radium treatment was given at regular intervals from June, 1918, to July, 1919, over four areas around the joint at 5 centimeters distance, three grains of radium being used each treatment. From the first there was disappearance of the pain, and a decrease in the swelling of the soft parts. During this time she walked comfortably with the aid of a crutch. The first part of July, 1919, she sustained a pathological fracture of the inner condyle of the femur, and, in addition, the *x*-ray plate showed active disease. An open operation was performed July 11, 1919, and the diseased bone thoroughly curretted away, and 2 grains of radium placed under inspection into the center of the cavity and left for twenty minutes, with the patient under the anesthetic. A plaster cast was applied for seven weeks, and then motion was encouraged. Since then she has been walking without assistance. There is still limitation to a small degree of extension and flexion. This inconveniences her very little, and for the past six months she has been doing gymnasium work.. An *x*-ray plate made six months ago shows definite formation, and no evidence of disease. When last heard from, the latter part of November, 1920, she was having no symptoms whatever from the trouble.

1418 EUTAW PLACE.

RESTORATION OF JOINT FUNCTION.

In fractures nearby or at distance from joints, convalescence is often prolonged by damage due to inattention to the joint while treating the fracture. Muscles and tendons become atrophied from nonuse. It is not uncommon to see an extreme toe-drop in a patient on crutches after treatment for a fracture of the leg or thigh, or a wrist-drop after a patient has recovered from a fracture of the forearm. Muscles and joints should be kept in as nearly normal condition during the treatment of adjacent fractures as possible. This can be done by massage and manipulation without disturbance of the seat of fracture. Such treatment tends to promote circulation of the blood and, as a result, more rapid healing.—CUNNINGHAM WILSON in the *International Journal of Surgery*.

THE SUBMUCOUS RESECTION OF THE NASAL SEPTUM.

W. MEDDAUGH DUNNING, M.D.,
NEW YORK CITY.
Consulting Otologist, Fordham Hospital; Consulting Otologist, Manhattan State Hospital; Consulting Laryngologist, Ossining City Hospital; Consulting Laryngologist; The Alexander Linn Hospital, Sussex, N. J.; Junior Surgeon Manhattan Eye and Ear Hospital; Surgeon, Bronx Eye and Ear Infirmary, etc.

(*Continued from the January Number.*)

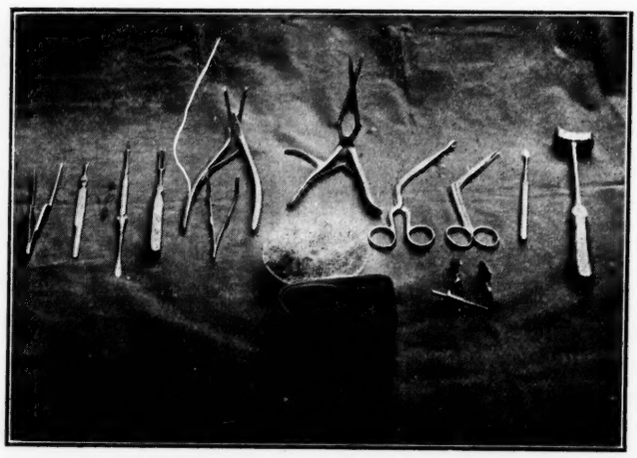
IV. SURGICAL PROCEDURE IN THE SUBMUCOUS RESECTION OF THE NASAL SEPTUM.

The operation now most frequently used for corfection of the deviations of the nasal septum which we have described in Section III. and which are remediable by surgery is an outgrowth of the work of Killian, Ballenger, Freer, and others in the early years of this century. In the last decade the technique has been perfected by improvement and adaptation in the tools used, by modification of the incision as the result of experience, greater care in the selection of cases, and a lowering in the time of the opertion. Operators specializing in this field lay increased emphasis on a knowledge of the anatomy, circulation, and neurology involved in a favorable prognosis. It is because of progress in these inter-related fields that the technique of this operation has reached the stage of perfection now attained.

The present day submucous resection operation superseded the earlier crushing and sawing operation of Asch and others. The older operations were productive of great shock with consequent traumatic disturbances, sometimes of long continuance. They were too often followed by hemorrhage, and destroyed excessive amounts of membrane with the consequent pathologic phenomena of scar tissue and poor drainage. The post-operative treatment by plugging was painful and sometimes indefinitely prolonged.

The septum, as we have said in Section I, is composed of a triangular cartilage with a supporting bony framework made up of ethmoid above and vomer below. This cartilage fits into the septal plate of the ethmoid, the vomer, and the intermaxillary ridge by means of a groove, half moon in shape, the seat of growths and adhesions under pathological conditions. It is here that injuries to the bone cause significant alterations, and it should be noted that the cartilage under ordinary circumstances sends out spurs from this groove, some apparently normal, others individual and pathological. The posterior edge of the septum is attached to the vomer, while the tip of the nose and the nasal ridge are the limits of the under surface. This septal cartilage is covered with a highly vascular mucous membrane of columnar epithelium. The area has an abundant blood supply, part from the naso-palatine arteries, from the nasal branch of the ophthalmic artery, the septal branch of the labial artery, and from a small branch of the facial artery which perforates the nasal bone and further supplies the anterior part of the septum. Because of the extent of the blood supply there is little danger of the parts becoming necrotic.

The indications calling for operative procedure in deviations of the septum have already been described in Section III. The procedure described in this section is observed in ordinary cases of curved or S-deviations, with no sharp angles. The operation calls for local anesthetization and is usually performed with the patient in a sitting posture. The following instruments are necessary: a reflected light; a small scalpel; a nasal speculum; a packing speculum; Dunning's combination curette elevator; a Ballenger swivel knife, punch forceps, (two styles); a small chisel and mallet.*



Instruments necessary in submucous resection of septum.

The patient, who should have spent the previous night in the hospital or under equally quiet conditions, is seated and his nose cleansed for anesthetization. It is impossible to cleanse the nose thoroughly because of the many openings, but we are aided by the fact that the nose is singularly free from infection. Unless there is indicated some idiosyncresy to cocaine, that drug is used as anesthetic. A nervous condition in the patient will predispose to cocaine poisoning; for this reason the writer prefers a weak solution, about equal parts of cocaine, 10%,

*Yankauer says that the ingenious Ballenger swivel knife, like the original cartilage knife of Killian, leaves a strip of cartilage on the crest. To obviate this he uses a hook-shaped separator, with a pair of forceps with hollow blades to cut the cartilage. The writer has found that this strip presents no particular difficulty, as it can be removed with ease by a curette.

and adrenalin chloride 1-1000. If anesthetization takes longer than the average of about 20 minutes, weaken the solution to 4%. Ballenger and Freer reduced the time for anesthetization by the use of pulverised cocaine with a 1-2000 solution of adrenalin. This reduces the time; but the writer believes that many of his colleagues will agree that the economy of time is made at the grave danger of cocaine poisoning from drifting crystals, when the powdered cocaine is used.

Complete and speedy anesthetization may be induced by care in the placement of the saturated plugs. Place the first plug, thoroughly moistened, high under the superior turbinate. This is often difficult because of the shape of the nose. Lay the next plug

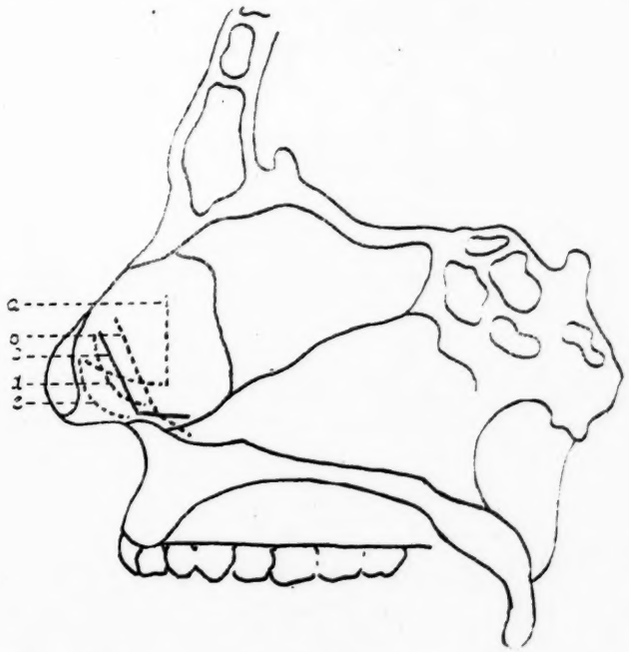


Fig. 5. Diagrammatic representation of incisions—(a), Freer; (b), Yankauer; (c), Dunning; (d), Killian; (e), Hajek.

above the lower turbinate and on the middle turbinate. Place the third as far underneath and posterior to the lower turbinate as it can be placed, well back toward the pharynx, leaving a generous length to fill the anterior parts of the nose. The skin of this part of the nose is affected through the circulation. Injection is never necessary if adequate time and care are given to this stage of procedure.

Much of the success of anesthetization is dependent on the careful orientation of these saturated plugs. If we recall the nervous system of the nose we know we are to reach the nerves above coming in from the cribriform plate as well as the ganglia of the spheno-palatine system. The second and third packings are so placed as to carry the cocaine posteriorly. In that region the septum is completely covered,—and is bleached and hardened by the process to the consistent texture of a linen handkerchief, or perhaps better, of a tanned hide.

After anesthetization is complete, the plugs are removed and the surgical procedure is initiated by incision. For convenience and therefore for speed and dexterity, the incision is made on the left side.

Much of the content of the earlier literature dealing with this operation on the septum is devoted to the character and position of the incision, or incisions. The old incision made at the tip of the nose is known as the Hajek incision; (Fig. 5) the one at the junction of the vestibular skin with the mucous membrane, the Killian incision. The latter incision

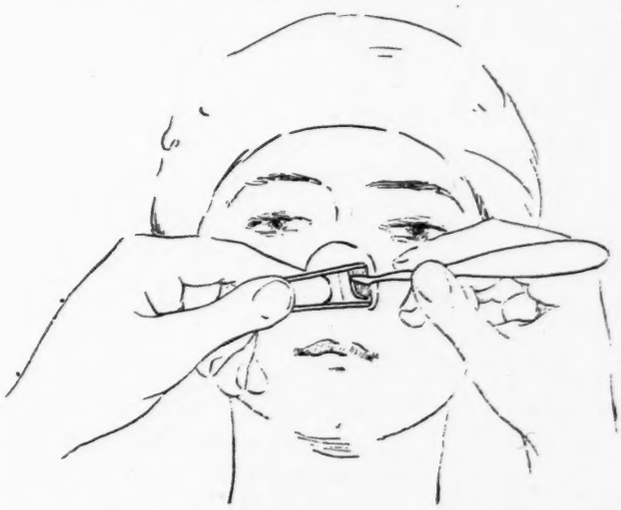


Fig. 6. Showing position of patient and scalpel at moment of incision.

was used by Ballenger except when the septal cartilage was deflected at the tip, when he used the Hajek incision. Krieg had made a U-shaped flap with three incisions. But observation of the secondary results of this operation showed that the problem was to avoid scar tissue that would interfere with one of the main functions of the septum, to facilitate the drainage accomplished by the capillary attraction between the secretions and the ciliated epithelial surfaces. If a thick horizontal band of squamous epithelium is formed by the operation, the flow of mucous is impeded, dries, and forms crusts. This called for the reduction to a minimum of the amount of scar tissue. Other modifications of the earlier incisions were concerned with the avoidance of perforations. It had been found that the largest number of these perforations had taken place with the flap incision. Hajek had made a single curved incision in the mobile septum along the anterior edge of the cartilage; but his operation left the dorsum of the nose supported by a strip of cartilage whose only attachment, the notch between the nasal bones,

was very weak. Killian had made a curved incision in front of the deviation with the convexity forwards. But in the more severe deviations the management of the lower part of the septum is "most difficult," to use his own words.

Years of operating have taught the writer that the most successful operations result from a vertical incision anterior to the white line appearing very distinctly in the anesthetized nose, at the point of junction between the mucous membrane and the true skin. This line, anterior to the Killian incision, is used as a guide in order to get a tougher membrane and to remove the anterior deviations if they exist.

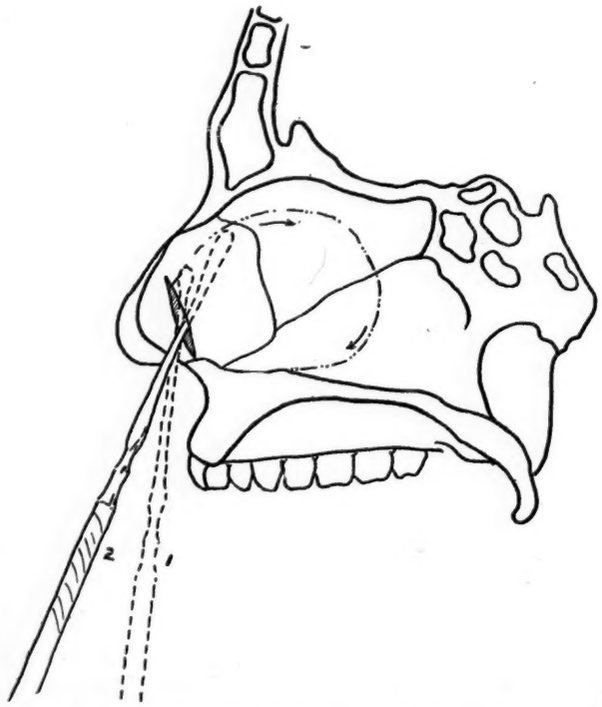


Fig. 7. Showing positions of curette elevator. (1) curette end; (2), elevator end; dotted line of direction with arrows indicates direction taken by instrument in loosening membrane.

In making this incision, the knife is inserted through the mucous membrane, to, but not through the cartilage. The cut is started about ¼ of an inch from the roof of the nose, and prolonged downward to the floor and outer wall, the deep L-incision being completed at the close of the operation for drainage purposes, and to lessen the danger of atresia. (Fig. 6)

The incision made, we elevate the muco-perichondrium from the cartilage by the use of the curette end of the elevator. This blunt instrument is safer, in order to avoid tearing. Starting at the highest angle of the incision and changing to the flat end of the elevator, we push gently backward, upward, then downward. (Fig. 7) In the majority of cases we are able to separate the mucous membrane from the cartilage, from part of the perpendicular plate of the vomer, with this stroke from behind forward. Then scraping through the cartilage at a point posterior to the incision and near the lower limit of the cartilage, as illustrated in figure 8, turn the curette so that its back lies on the membrane and scoop out the cartilage by a forward and upward stroke. This process should

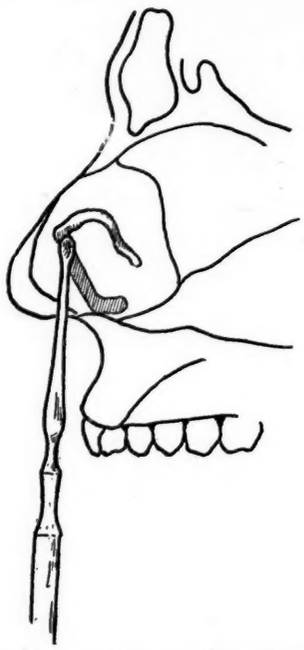


Fig. 8. Showing curette scooping cartilage in cavity at beginning of operation.

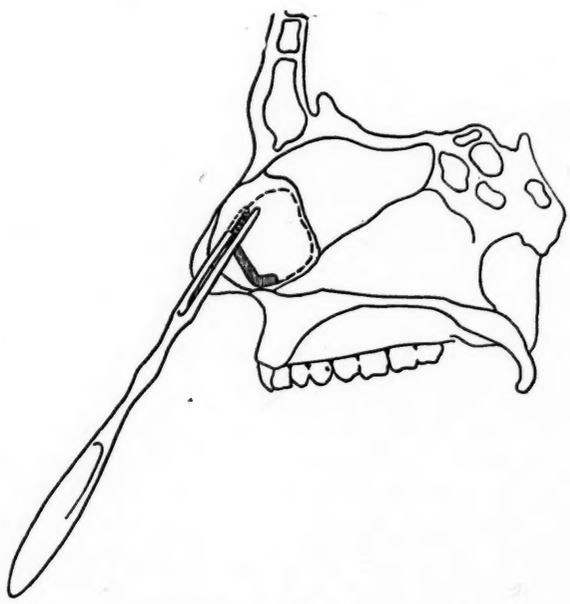


Fig. 9. Showing position of Ballenger swivel knife at point of entrance. Dotted line shows direction taken by knife.

be completed along the line posterior to the incision in order to avoid perforation opposite the incision at that point, if one was unfortunate enough to go through the membrane of the opposite side. The next stage is the complete separation of the muco-

perichondrium from the septum on the opposite side, with the same procedure. When this is done the deflected cartilage may be removed either with the Ballenger knife or with forceps. (Fig. 9) The operator should use great care at this point to avoid any use of force, in order not to dislocate the septal cartilage from the lateral cartilages and the nasal bones which aid in the formation of the bridge of the nose.

If the deformity is not corrected by the removal of the cartilage in the way described, a cutting forceps is next inserted through the incision. Bite with this forceps through the junction of the perpendicular plate of the ethmoid with the cartilage at the highest point. (Fig. 10) The surgeon must exercise great caution at this point to avoid fracture of the cribriform plate,—a danger against which one can easily guard. The perpendicular plate of the ethmoid and any part of the vomer causing obstruction is removed (Fig. 11) with the aid of a punching forceps. The incisor crest usually causes more or less obstruction;

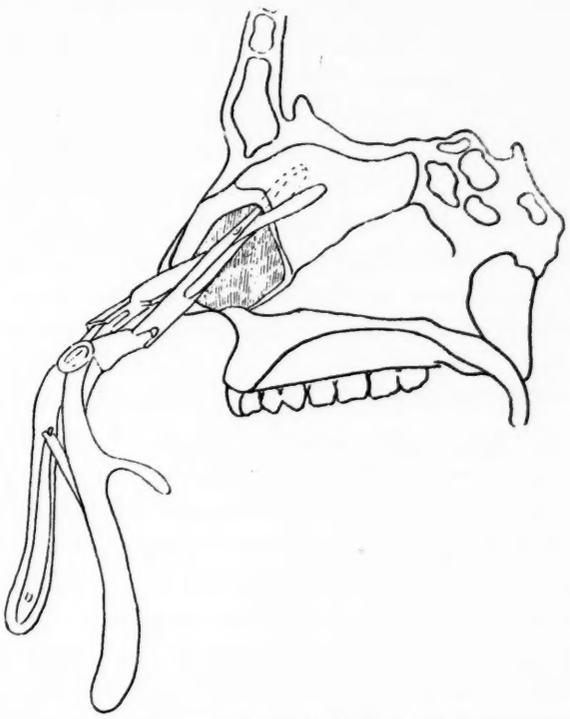


Fig. 10. Showing use of punch forceps after removal of cartilage and starting removal of bony structure.

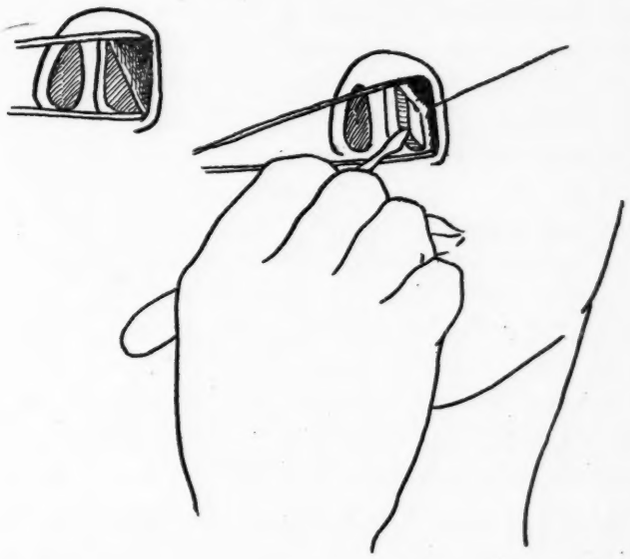


Fig. 12. Diagrammatic explanation of procedure with speculum and scalpel in place in separation of membrane from bone on floor of nose preparatory to removal of portions of intermaxillary ridge.

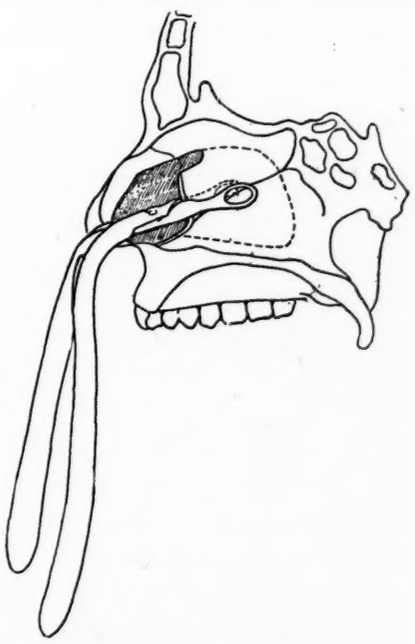


Fig. 11. Continuing figure—at late stage in removal of bone by punch forceps.

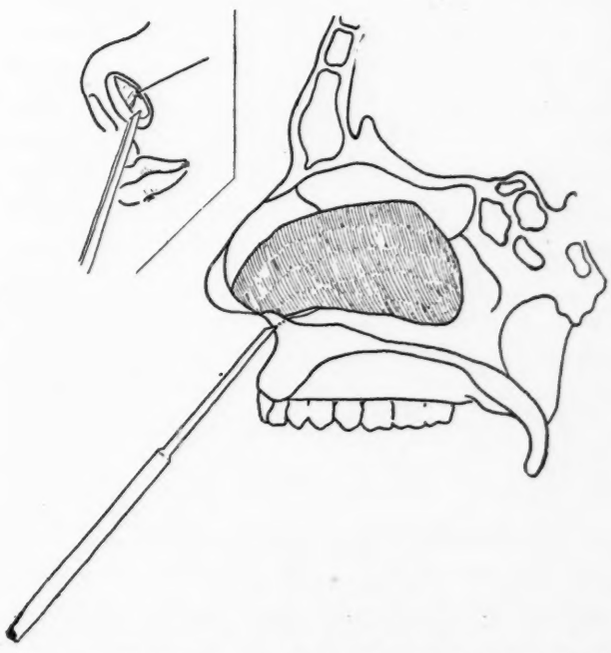


Fig. 13. Showing procedure with chisel and mallet in removal of intermaxillary crest.

was very weak. Killian had made a curved incision in front of the deviation with the convexity forwards. But in the more severe deviations the management of the lower part of the septum is "most difficult," to use his own words.

Years of operating have taught the writer that the most successful operations result from a vertical incision anterior to the white line appearing very distinctly in the anesthetized nose, at the point of junction between the mucous membrane and the true skin. This line, anterior to the Killian incision, is used as a guide in order to get a tougher membrane and to remove the anterior deviations if they exist.

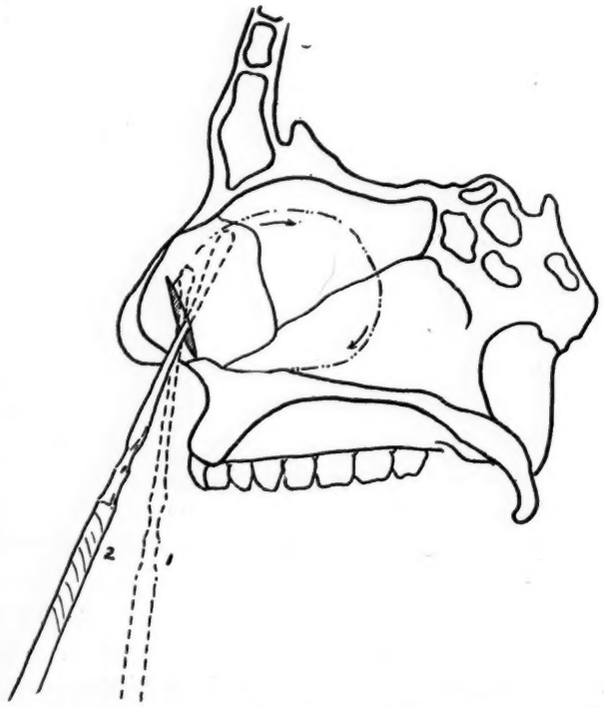


Fig. 7. Showing positions of curette elevator. (1) curette end; (2), elevator end; dotted line of direction with arrows indicates direction taken by instrument in loosening membrane.

In making this incision, the knife is inserted through the mucous membrane, to, but not through the cartilage. The cut is started about ¼ of an inch from the roof of the nose, and prolonged downward to the floor and outer wall, the deep L-incision being completed at the close of the operation for drainage purposes, and to lessen the danger of atresia. (Fig. 6)

The incision made, we elevate the muco-perichondrium from the cartilage by the use of the curette end of the elevator. This blunt instrument is safer, in order to avoid tearing. Starting at the highest angle of the incision and changing to the flat end of the elevator, we push gently backward, upward, then downward. (Fig. 7) In the majority of cases we are able to separate the mucous membrane from the cartilage, from part of the perpendicular plate of the vomer, with this stroke from behind forward. Then scraping through the cartilage at a point posterior to the incision and near the lower limit of the cartilage, as illustrated in figure 8, turn the curette so that its back lies on the membrane and scoop out the cartilage by a forward and upward stroke. This process should

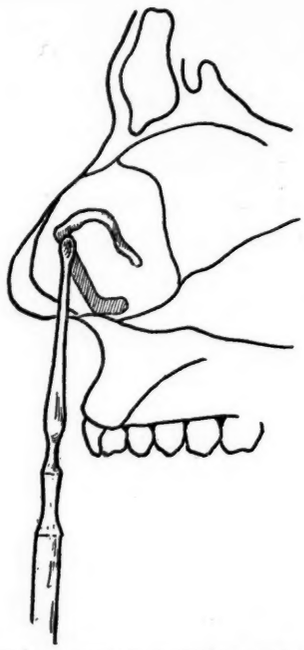


Fig. 8. Showing curette scooping cartilage in cavity at beginning of operation.

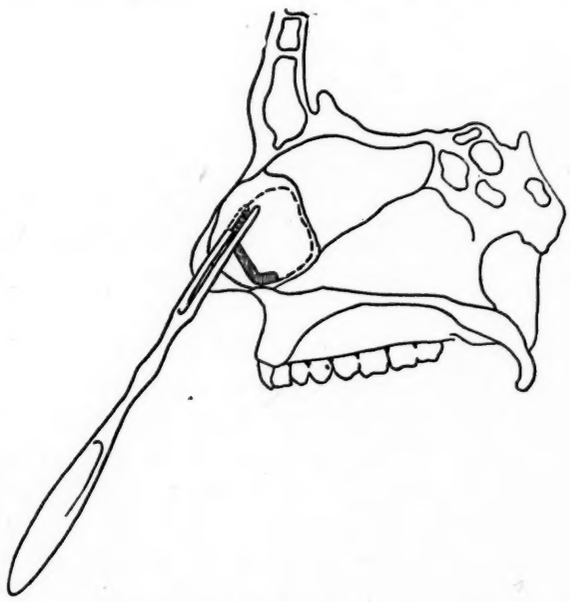


Fig. 9. Showing position of Ballenger swivel knife at point of entrance. Dotted line shows direction taken by knife.

be completed along the line posterior to the incision in order to avoid perforation opposite the incision at that point, if one was unfortunate enough to go through the membrane of the opposite side. The next stage is the complete separation of the muco-

perichondrium from the septum on the opposite side, with the same procedure. When this is done the deflected cartilage may be removed either with the Ballenger knife or with forceps. (Fig. 9) The operator should use great care at this point to avoid any use of force, in order not to dislocate the septal cartilage from the lateral cartilages and the nasal bones which aid in the formation of the bridge of the nose.

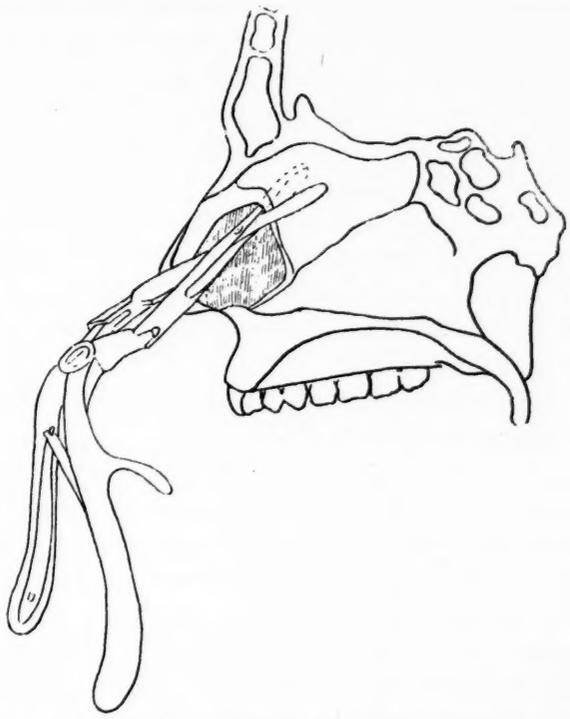


Fig. 10. Showing use of punch forceps after removal of cartilage and starting removal of bony structure.

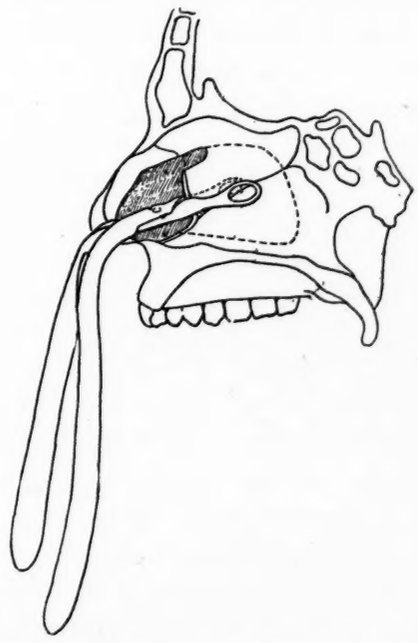


Fig. 11. Continuing figure—at late stage in removal of bone by punch forceps.

If the deformity is not corrected by the removal of the cartilage in the way described, a cutting forceps is next inserted through the incision. Bite with this forceps through the junction of the perpendicular plate of the ethmoid with the cartilage at the highest point. (Fig. 10) The surgeon must exercise great caution at this point to avoid fracture of the cribriform plate,—a danger against which one can easily guard. The perpendicular plate of the ethmoid and any part of the vomer causing obstruction is removed (Fig. 11) with the aid of a punching forceps. The incisor crest usually causes more or less obstruction;

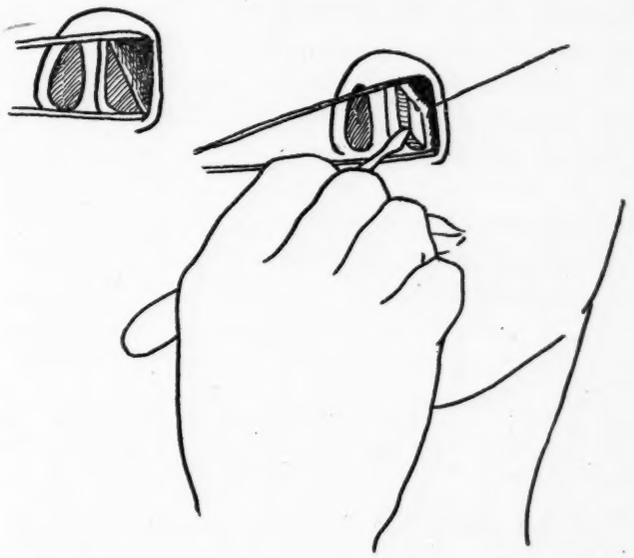


Fig. 12. Diagrammatic explanation of procedure with speculum and scalpel in place in separation of membrane from bone on floor of nose preparatory to removal of portions of intermaxillary ridge.

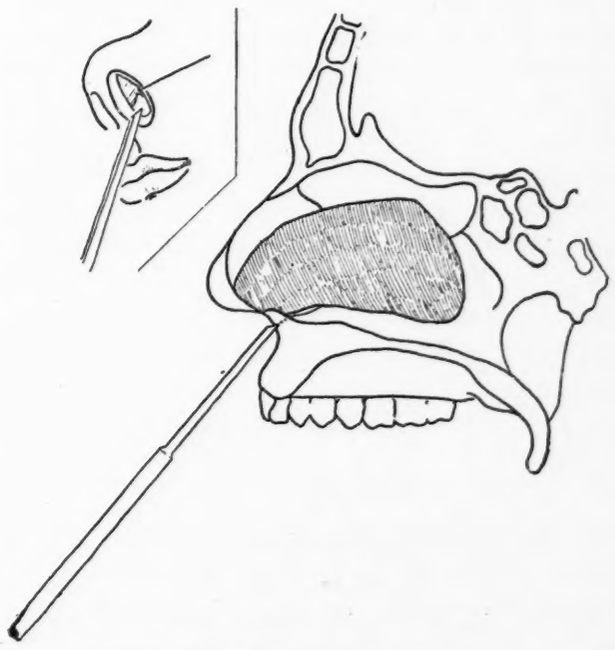


Fig. 13. Showing procedure with chisel and mallet in removal of intermaxillary crest.

here also is often found a large amount of fibrous tissue and adherent membrane, especially at the junction of the perichondrium and the periosteum. After the cartilage lying above is removed, these may be separated by a sharp knife, if one will remember to keep the sharp edge of the knife on the incisor crest. (Fig. 12) The incisor crest is then removed with a

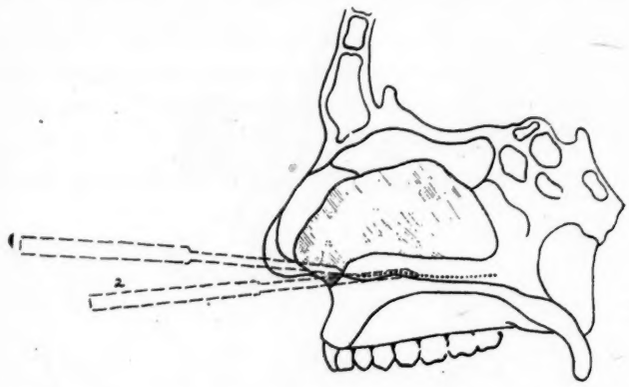


Fig. 14. Showing later stage of procedure with mallet and chisel in removing portion of maxillary ridge; (1) and (2) show instrument's change of position—Chisel not driven so far usually, as indicated in diagram.

chisel and mallet. It should be remembered that the incisor crest extends well forward; if, therefore, the chisel is inserted well down on the crest and driven upward it will separate with the exertion of very little force. (Fig. 13)

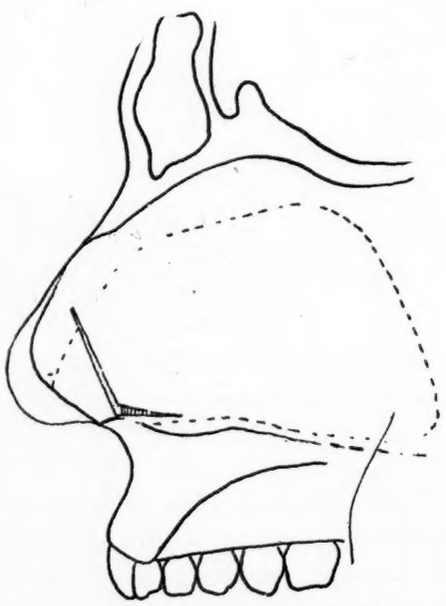


Fig. 15. Diagram showing completion of L incision.

On the removal of the incisor crest, together with the other bony and cartilaginous portions of the septum, there is left a roomy opening between the membranes. The operator has now to deal with the intermaxillary ridge, which is thin below its junction with the triangular cartilage. If the chisel is inserted so that it reaches the ridge, with one or two slight taps the bone can be fractured for considerable distance posteriorly. (Fig. 14) It is then easily removed with a curette or with forceps. .

The division of the membrane is now continued at its outer angle for a little more than 1-3 of an inch posteriorly, to facilitate drainage and relieving danger of atresia. Replace the mucous membrane on the septum. The sac is thoroughly cleansed, the blood clots and any remaining small pieces of cartilage and bone are removed. The septum is lined to see if there is any remaining deviation; if not, the membrane is replaced in position. (Fig. 15) It will be found that the membrane has contracted; because of this there is but little danger of hematoma. The healing process will be aided by the drainage at the end of the L-incision.

The surgical procedure in an uncomplicated case of curved deviation is now complete. The nares are packed with vaseline gauze, which is left in place for twenty-four hours. Care should be exercised in packing that the gauze is placed not too far posteriorly, in order to avoid irritation of the Eustachian tube and also to avoid follicular tonsilitis. After the removal of the gauze, the patient is instructed to insert white vaseline in the nose. A few crusts will form; these should be removed about once a day. There is little reaction from this operation, and the patient is usually able to return to his ordinary pursuits in about 48 hours after the packing is removed.

(To be concluded)

SYPHILIS IN THE NOSE THROAT AND EAR.

Conditions of the mouth, throat and larynx which may be due to syphilis are tumors, ulcerations, perforation of the soft palate, deviation of the tongue, Hutchinson's teeth, high arched palate, chronic laryngitis, and paralysis of one or both vocal cords. Perforation of the soft palate and paralysis of the vocal cords are extremely likely to be of luetic origin.

Perforation of the septum of the nose is very likely to be due to syphilis. Also tumor formations and ulcerations in the nose should be considered as possibly due to this disease. The saddleback nose deformity is especially suggestive of hereditary syphilis.

Sudden loss of hearing without pain and with tinnitus, in a young man, would suggest the almost certainty of syphilitic involvement of the eighth nerve and labrynth.—J. D. WILLIS in the *Virginia Medical Monthly.*

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WALTER M. BRICKNER, M. D., F. A. C. S., Editor.

New York, February, 1921.

RADIOTHERAPY IN CANCER.

It is quite unnecessary to recite the limitations and disappointments of surgery in the treatment of malignant neoplasms. In the search for remedies to supplement or, better, supplant surgery in these affections, it is interesting to note the developments that have taken place in the field of radiotherapy, and the increasingly favorable results that have been reported as its technics have improved.

The beneficent effects of radium in carcinoma of the cervix uteri were some years ago demonstrated by Howard Kelly, who also established that radium often acts like magic in lymphosarcoma and Hodgkin's disease. The "radium pack" and, especially, the implantation of radium emanation needles, appear to be accomplishing good results in some cases of cancer elsewhere situated. Even in cancer of the tongue—in which the results of surgical treatment are notoriously bad—the effects of radium emanation implantations are said to be "encouraging."

The most striking recent advances in radiotherapy of which report has come to our notice are described in the account published by Sittenfield (*Journal of the A. M. A.*, January 8, 1921) of his observations of roentgen therapy of cancer as practiced now in Germany. The technic, he reports, has undergone great changes. More powerful *x*-ray apparatus, and new type tubes of high-tension voltage are employed; and "in particular, accurate measurements have been established, thus making possible exact dosage in carcinoma, sarcoma and benign tumors." The modern roentgen apparatus he found in use operate with an intensity of 180 to 220 thousand volts, and it requires 25 mm. of lead to absorb the hard rays produced by it. Much greater penetration is possible with these more powerful machines and improved vacuum tubes, and, too, it has been made possible to determine the exact dosage, dispersion and absorption coefficient. It is important, Sittenfield records, that all parts of the tumor receive the same homogeneous radiation, preferably in one sitting.

With the more powerful apparatus and accurately estimated dosages, *x*-ray treatments occupying six to eight hours at a time (raying four to seven fields) are administered in the gynecological clinics of Bumm (Berlin), Seitz and Wintz (Erlangen) and Opitz (Freiburg). At Freiburg, says Sittenfield, no cancer of the uterus had been operated upon since January 1, 1919. Wintz reported to him that he had radiated 3,000 cases of uterine cancer in the past 7 years and that of the cervix cancer cases 45% were alive after four years! Opitz had treated 41 cervix cancer cases, of which 22 had receded, 10 were not influenced, and 9 died. "Receded" is a term rather too vague for one who would wish to learn whether there were any cures.

The surgical treatment of neoplasms is purely mechanical; it aims to remove all the affected tissue en masse. Radiotherapy is an empirical treatment; it aims to destroy the tumor cells in situ. There is no present reason for believing that either of these methods—and they are the best now at our disposal—or the combination of them, will ever become the long-sought *cure* of malignant growths. Before a specific therapy can be evolved we probably shall have to know much more concerning the cause of neoplasia and the nature of malignancy—both of which are problems that have baffled the many great minds that have struggled with them.

Surgical Suggestions

Do not attempt a radical operation for malignant growth before excluding as far as possible—by physical signs or (and) roentgenography—the presence of a distant metastasis. Cancer of the breast and the prostate usually metastasises in the spine and the lungs; cancer of the rectum, in the liver; hypernephroma, in the bones; sarcoma of the bones, in the lungs.

An ulcerating lesion upon the hand or foot should always be suspected of epithelioma, just as much as one would suspect such a growth upon the face, where it is more common. It may proceed from an irritated wart or keratosis. Before deciding on radium or *x*-ray treatment in preference to excision, be sure that there is no evidence of lymph-gland extension.

An acute effusion into the joint of a child, with fever, pain, and redness, swelling and bone tenderness extending beyond the joint, arises from an epiphysitis—or, more properly, a juxta-epiphyseal osteomyelitis. The lesion is most common in the lower end of the tibia. Do not be in a hurry to operate in this type of osteomyelitis; it often recedes spontaneously. When the symptoms have subsided continue to keep the child in bed or protect the joint by a plaster cast.

The most common cause of pain in the upper arm is subdeltoid bursitis. With it there may be great, moderate or only slight loss of shoulder function · pain on motion. Pain referred to the shoulder itself is not essential to the diagnosis.

The *x*-ray shadow of a lime deposit beneath the subdeltoid bursa may be found in shoulders that give no symptoms. *Per contra,* in cases of undoubted and severe subdeltoid bursitis the lime deposit is often absent.

The first and most important step in the treatment of subdeltoid bursitis with limitation of shoulder movement is to secure abduction of the arm by graduated elevation and relaxation in bed. When fair abduction has been thus accomplished continue the treatment by means of light Indian club exercises. Immobilization in these cases is bad treatment.

Those who do not know that the lymph glands in the parotid region may be the seat of tuberculous infection are apt to mistake the swelling caused by such an involvement for a parotid tumor.

In cases of hyperthyroidism improvement or even apparent cure while the patient remains in the hospital is not conclusive evidence of the beneficence of the treatment, whether it was by surgery, medicine or the *x*-ray. The symptoms may, and often do, recur when the patient returns to the environment in which they developed.

Progress in Surgery

Selections from Recent Literature

H. Lyons Hunt, F. R. C. S., Abstract Editor

Are There Reliable Criteria of Operability in Exophthalmic Goiter? DAVID CHEEVER, Boston. *Archives of Surgery,* January, 1921.

The author discusses the disadvantages of operative procedure under three heads—

1. The associated mortality.
2. The ordeal of the operative experience.
3. The scar.

As the first is the only one deserving serious consideration in expert hands he suggests that by the consideration of the following points the resistance of the patient to operative trauma may be determined—

1. The history, with special reference to the age of the patient, the degree of asthenia, the loss or gain in weight, and the presence or absence of a "wave" of hyperthyroidism.
2. The general clinical picture, including as an important factor, the mental attitude.
3. The presence or absence of organic disease of the heart and other viscera, especially the kidneys, liver, and the cerebrum.
4. The presence or absence of an enlarged thymus.
5. The blood pressure.
6. The pulse rate.
7. The epinephrin test.
8. The administration of thyroid extract.
9. The determination of the basal metabolism.
10. The manner in which the patient withstands the strain of preliminary procedures involving psychic disturbances or surgical trauma.

Classifying cases in accordance with Means and Aub—into vagotonic and sympathetico-tonic, (type 2 and type 1) respectively, and after careful consideration of these enumerated headings and the citation of ten cases, Cheever summarizes as follows—

Can satisfactory deductions be drawn from these cases to assist in determining reliable criteria of operability? The suggestion of Means and Aub that patients falling into their Type 2 ("vagotonic" group) give a more serious prognosis, does not seem to be wholly sustained by the cases studied. Of the four fatal cases, two belonged to the "sympathetico-tonic" and one to the "vagotonic" group, while one showed different phases, permitting its classification in either group. Of the others, four cases showed very serious post-operative reactions, and of these, three can be classified as "vagotonic" and one as "sympathetico-tonic". The remaining patients, two cases were "vagotonic" in type with high metabolism, but both made good recoveries without undue reaction; the operation being ligation in one and the radical procedure in the other. Evidently an investigator with a theory to defend could find in these cases support to either point of view. Perhaps the weight of evidence favors the impression that the "vagotonic" group gives the more serious prognosis.

As far as these cases go, no definite level of pulse or metabolism can be said to constitute an absolute contraindication. One death occured in a patient with a metabolism as low as + 33. It is certainly striking that three of the four fatal cases were those of Jewish women, since in a series of cases of exophthalmic goiter at Peter Bent Brigham Hospital, the proportion of Jewish women was less than one-fifth. It seems worth while to allude more specifically to the possibly very great importance of testing a patients ability to withstand operative trauma by one or more preliminary minor procedures. (No comment is intended to be made in this paper on the therapeutic effect of these measures, although they are usually, of course, designed to lessen the thyrotoxicosis). Such a point of view is mentioned by many writers. Watson says that preliminary injections of saline solution or sterile water should be made into the gland "to raise the patient's threshold of stimuli, thereby preventing an

acute attack of hyperthyroidism which might otherwise follow the first quinin and urea injection." Sistrunk speaks of ligation as a means of testing the ability of the patient to stand any operative procedure without precipitating a severe crisis of hyperthyroidism.

It seems reasonable to offer the subjoined tentative conclusions with regard to criteria of the ability of the patient with exophthalmic goiter to withstand the strain of operative therapeusis:

1. During an acute exacerbation of the disease, or in periods of great mental depression, operation is contraindicated.
2. Muscular weakness so great that the patient cannot walk and marked loss of weight with continued loss under absolute rest are serious contraindications.
3. Organic visceral disease so serious as to jeopardize patients having any operation of similar technical type is a contraindication.
4. Operation should not be undertaken in the presence of an enlarged thymus, until its probable activity has been reduced by irradiation.
5. The Jewish race offers a distinctively higher operative mortality.
6. A metabolism of + 30 introduces a serious risk, which undoubtedly increases with high rates, but not necessarily in proportion, and there is no rate of metabolism which alone contraindicates at least minor surgical procedures.
7. The "vagotonic" type is possibly more vulnerable to the operative ordeal than is the "sympathetico-tonic", but evidence on this point is as yet inconclusive.
8. The minor procedures, whether consisting of injections into the gland, cauterizing or ligating operations, are often most valuable indices of a patient's resistance to trauma.

In hyperthyroidism, operations will always be attended by a peculiar factor of danger, not present in other operations that are technically similar.

Radium in Toxic Goiter. W. H. B. AIKINS, Toronto. *American Journal of Roentgenology,* November, 1920.

The author reviews the outstanding features of toxic goiter—also the etiology—which he gives as following: (a) The psychic causes, which include fear, shock, or other violent emotions; (b) Infected foci, e. g., tonsils, adenoids, etc.; (c) hyperactivity of other endocrinous glands, present, for example, at puberty, pregnancy or the menapause.

His report is based on a series of about 100 cases treated by radium, in addition to the usual medical treatment, and he is convinced of the value of radium treatment in preference to surgery. He gives the following grouping of cases: Group 1, mild toxic goiter, as seen in adolescence. Group 2, grave toxic goiter with enlarged gland. Group 3, grave toxic goiter with little or no enlargement of the thyroid gland. Comparing the superiority of radium to that of the *x*-ray, he quotes Dawson Turner who says, "As compared with *x*-rays in the treatment of this condition, radium has the following advantages: (a) absolutely constant emission of rays and therefore exact dosage possible; (b) far greater penetration of its rays, so that the deeper parts of the gland are reached; (c) no noisy exciting apparatus so that the treatment can be applied at the bedside without in any way disturbing the patient. The words *cito, tuto, et jucunde* can fairly be applied to the radium treatment of exophthalmic goiter. G. S. REITTER.

Malignant Adenopathy of Bones of the Foot, Probably of Thyroid Gland Origin. HERBERT H. BROWN, Rochester, N. Y. *Journal of the American Medical Association,* December 25, 1920.

Brown cites the case of a woman, aged 40, who at 31 had the thyroid gland removed and was told that the gland contained a tumor. Her health was good for five years when she began to suffer from lumbago and a very tired feeling. Shoes worn at about this time were too small, and the toe was pinched. Later the toe became inflamed and then "broke down," but finally formed granulation tissue and healed. Later throbbing, dull pains were noticed in the toes of one foot, and a roentgenogram at that time disclosed a distinct loss of bone substance of the toes, four of which were removed at two operatins. After about a year and a half a swelling was noted on the dorsum of the foot, and on the right ankle. The tumor mass was soft and painless to palpation and also to the needle. The roentgen ray disclosed a definite loss of bone substance of the fibula and the fifth metatarsal bone, with little or no involvement of the joints. Roentgenograms of all the other bones of the body were negative. A diagnosis of a bone tumor of probable thyroid origin was made. The great toe was amputated for pathalogic diagnosis, and sections showed a malignant and rapidly growing adenoma. Following the histologic studies, the leg of the patient was amputated by Dr. Prince at a point several inches above the tumor masses shown in the roentgenograms in the hope that the neoplasm might be primary at this site rather than metastatic from the thyroid gland tumor that was reported to have been removed some seven years previous. In none of the sections was it possible to find colloid deposits, so it is impossible to state that the neoplasm is derived by metastasis from the tumor of the thyroid reported to have been found.

Carcinoma of the Prostate. A Clinical Study. H. C. BUMPUS, Rochester, Minn., *Surgery Gynecology and Obstetics,* January, 1921.

The author states that the comparatively recent introduction of radium as a therapeutic agent has centered medical interest around the various aspects of the treatment of carcinoma of the prostate, and current literature abounds with cases thus treated, whereas the frequency of the disease, the clinical findings, the results of its surgical treatment and the prognosis were almost established facts which the occasional atypical case but served to emphasize. Now the entire progress of the disease has become altered by the therapy and all the various phases are opened again to new investigation. This study deals with metastasis and is based on 362 cases of carcinoma of the prostate, observed at the Mayo Clinic during the years 1914 to 1919 inclusive. Of these, 79, (21 per cent.) show metastasis.

A review of the lymphatic drainage of the prostate is given, with the following metastases occurring—in glands, 37; inguinal glands, 20; iliac glands, 12; cervical glands, 9; (left cervical, 7), and retroperitoneal glands, 5.

Glandular invasion may be very extensive without giving physical signs and not demonstrated clinically, often until the glands have enlarged sufficiently to become palpable through the abdominal wall or through the rectum.

Pain was present as an early symptom in 34.1 per cent. of these cases.

Pathologically, cancer of the prostate may be primary in the gland; more frequently it is associated with simple hyperplasia. Clinically, two fairly typical types occur: Type 1. Slight enlargement of the gland with very few local symptoms, and often discovered only because of symptoms produced by metastasis. Even in the late stages, the gland does not enlarge extensively. The characteristic stony hardness is usually absent. Microscopically, this type shows cancer cells scattered throughout a somewhat increased fibrous stroma and almost no tendency to grandular formation. Type 1 is far more malignant than type 2. Type 2 is the more common type, showing any degree of enlargement of the gland—but the topography of it is always the same. Its contour is irregular and has a characteristic stony hardness even when the masses are palpated through normal or hypertrophied gland. It spreads upward into the vescicles—either unicornate or bicornate—and often causes rectal obstruction. Microscopically, type 2 shows cuboidal, columnar and undifferentiated cancer cells crowding poorly formed gland acini or breaking through into the stroma.

Type 1 offers a graver prognosis to radium therapy than type 2.

Osteoplastic and Osteoclastic Metastasis.—A review of the literature and table of the cases of metastases to bones found at necropsy are given, also tables of incidence of metastases in this series of cases which show that 41 cases, or 51 per cent., of the 79 cases with metastasis had bone involvement and that 30.3 per cent. of the 135 cases *x*-rayed showed bone metastasis. Of the above cases that were *x*-rayed 30 showed bone metastases to the pelvis, 24 to the spine, 6 to the femur, 6 to the ribs and 3 to the lungs.

Other metastases were spinal-cord, 8, and 40 cases which had only a single metastasis as follows: Pelvis, 9; inguinal glands, 7; cervical glands, 5; spinal cord, 5; iliac glands, 4; spine, 3; ribs, 2; femur, 2; retroperitoneal glands, 1; skin, 1; liver, 1. Various clinical manifestations are discussed with symptoms and urinalyses. The type of gland and not the presence of metastasis determine the course of the disease, type 1 being undoubtedly shorter than type 2.

Conclusions—1. Metastasis to the glands probably occurs more frequently in cases of carcinoma of the prostate than is demonstrated clinically because of the inaccessibility of the glands first involved. 2. Two distinct types are distinguishable clinically and microscopically. 3. The smaller type of carcinoma gives clinical and miscropical evidence of greater malignancy. 4. The large type tends to remain localized, resulting in urinary symptoms and producing metastasis later in the disease than the smaller clinical type. 5. The larger clinical type is more amenable to radium therapy because of its lesser potentiality of malignancy. 6. One-third of the patients with carcinoma of the prostate have osseous metastasis demonstrable by the *x*-ray. 7. The pelvis and spine are the most frequent sites of osseous metastasis. 8. Metastasis to the lung rarely occurs—probably never alone. 9. Metastasis to the spinal cord closely simulates primary cord tumors and often occurs when the prostate is but slightly damaged. 10. Pain is absent in one-fourth of all cases with metastasis. 11. Urinary symptoms are absent in 11.5 per cent. of all cases with metastasis. 12. Neuralgic and rheumatic pains in men above middle age—even in absence of urinary symptoms—should suggest the possibility of carcinoma of the prostate.

G. S. REITTER.

The Rationale of Radium Therapy in Cancer. ISAAC LEVIN, *The New York Journal of Roentgenology*, November, 1920.

By a series of observations and experiments the author establishes the fact that the biological effect of the rays from radium and the *x*-rays differ within the various tissues of plant and vertebrate animal organism. He defines "selective action" as meaning that the *identical rays act differently on different tissues.* He cites the selective action of radium on the lymphocytes in lymphatic luekemia and shows that myelocytes in myelogenous leukemia are rapidly reduced by radium, while the myelocytes in the blood of cases of skeletal metastasis of carcinoma *are* not influenced by the rays. Through the myelocytes in these two conditions are morphologically identical, they differ biologically.

By "selective absorption" is meant that the same tissues may destroy or "absorb" one type of ray and not influence another—as for example, the effects of the different rays on the skin.

Only by arriving at a true understanding of both the phenomena of "selective action" and "selective absorption" can a correct valuation be placed upon each, and will the best type of ray, methods of filtration, and correct distance be applied in therapy. The effect of radium on cancer is a "selective action." Microscopically, cancer tissue shows degeneration of the cells—consisting of vacuolation of the protoplasm, pycnosis of nuclei, karyolsis, and ultimately complete necrosis of the cell. These cellular changes are accompanied by a round cell infiltration, which is subsequently changed into dense sclerotic connective tissue, poor in bloodvessels. This new connective tissue formation ultimately dominates the picture to such an extent that some observers maintain it is the only direct effect of radiation. To show that this is true, the author cites his experiments on crown gall. The role of the newly formed connective tissue is that of a protective barrier around the cancer.

Levin shows that skeletal metastasis usually begins development within the bone marrow. Two types of changes occur—osteoplastic and osteoporotic and that radium therapy enhances the healing power of the organism, destroys a major part of the malignant tumor and surrounds it with newly formed bone.

Buried emanation by correct technique will, in the near future, supercede the external application of radium in combination with incomplete surgery and become the method of choice in many conditions—though it should always be accompanied by external application in the areas of the regional lymph glands and areas directly adjoining the tumor. Repeated properly selected doses are to be preferred to one intense dose, followed by another application at a longer interval. The presence of "stunned" cells would seem to indicate the above preference for repeated smaller doses.

Conclusions—Radium is the most powerful agent in the whole therapeutic armamentarium of medicine and its selective action presents a most remarkable phenomenon. (2) It is gradually dissipating the feeling both within the profession and the laity that a diagnosis of cancer means a death warrant. (3) Each radium establishment which controls large quantities of element should become a center of cancer research.

G. S. REITTER.

Stasis and Prevention of Cancer. A. C. JORDAN, *British Medical Journal*, December 25, 1920.

In an address delivered before the Hunterian Society, the speaker made the following suggestions to prevent the occurrence of cancer:

1. Avoid stasis in general, with its attendant toxemia; in other words, keep all the tissues healthy.

2. Avoid sources of local irritation in the aliminetary tract.

(a) In the lips and mouth and tongue—avoid rough pipe stems, jagged teeth; abolish pyorrhea.

(b) In the pharynx and larynx—eliminate chronic catarrh.

(c) In the esophagus—swallow no large boluses of food; eat slowly; masticate thoroughly.

(d) In the esophagus and stomach—avoid excess of strong irritant spices (for example, mustard, pepper) and avoid extremes of heat and cold, especially in drinks.

(e) In the stomach and duodenum—prevent duodenal distension, pyloric spasm, and duodenal and pyloric congestion, by abolshing the ileal stasis which causes them.

(f) In the small intestine—prevent bacterial decomposition of the contents of the jejunum and ileum due to ileal stasis.

(g) In the large intestine—prevent stagnation and decomposition of solid feces in any part; combat catarrh by local and general means.

It is never too early in life to commence these measures. In infancy, even on the first day of life, see to proper feeding. If artificial feeding is necessary the milk should be given at regular intervals in measured amounts at correct temperature; avoid overfilling the infant's stomach. Constipation in the infant is best combated by small doses of liquid paraffin.

In childhood, provision should be made for warm clothing, good regular meals, with vitamines in the diet, and an active day with midday rest, and a long, restful night. During school and college years the same conditions should be continued, with a regulated open-air life, avoiding extremes of exhaustiing effort, and insisting on an early hour for retiring and a minimum of eight hours in bed.

In patients who have not had the advantage of suitable conditions from infancy—that is, in whom stasis in a more or less severe degree is already present, the exact method to adopt must depend on the precise anatomical and pathological conditions which exist. If mechanical faults are present—for example, obstruction due to bands, or to cicatrices—these must be dealt with by surgical means. If the large intestine is already grievously damaged so that it is no longer capable of repair, nothing short of its removal will avail.

In less extreme cases much good may be done by careful attention to the details of hygenic living already described. In addition, mechanical means should be taken of supporting unduly dependent portions of the bowel, and liquid paraffin given to ensure two or three soft exacuations daily, vaccines to overcome the toxemia due to bacterial action in the large and small intestine, while medicines are useful to aid digestion, combat catarrh, and lessen spasm at the sphincters.

Cancer of the uterus and ovaries follows upon chronic inflammatory conditions of these organs. As already explained, stasis plays a very important role in bringing about these conditions of chronic inflammation. It is clear, therefore, that much can be done to prevent the occurrence of cancer in the pelvic organs by means which prevent or relieve chronic intestinal stasis.

Exarticulation of the Hip Joint. BARNEY BROOKS, St. Louis. *Journal of the American Medical Association,* January 9, 1921.

Brooks cites a case in which preliminary ligation of the common iliac artery was performed before the hip joint exarticulation was undertaken. There was little loss of blood. The patient's general condition was not disturbed by the operation, and the anemia of the tissue was not severe enough to influence the kindly healing of the operation wound.

Operative Treatment of Old Hip Disease. MARK H. ROGERS AND CHAS. W. PEABODY, Boston. *Journal of Orthopedic Surgery,* January, 1920.

The authors divide their cases into three groups in an endeavor to standardize a treatment to be used in each type.

The first group consists of those with practically ankylosis, fibrous or bony, but firm, with deformity of the hip joint, flexion and abduction, and shortening. The second group consists of those cases with deformity and with definite motion in the hip joint. The motion may be very slight, and may be difficult to obtain on account of muscular spasm but when these cases are under ether, there is always more motion that suspected. The third group consists of those cases in which the head of the femur is destroyed and the trochanter rides up on the acetabulum. This is the more rare condition and a difficult one with which to deal. There is practically always motion as well as deformity, and great disability on account of instability.

The first group, those cases with ankylosis and deformity, is treated with some form of osteotomy near the trochanter and outside the joint for the correction of the deformity.

In the second group, those cases that show deformity and motion, with a portion of the head left in the acetabulum, a Smith-Petersen incision is made from the anterior superior spine down the thigh. The space between the tensor vaginae femoris and the sartorius is located. This is the anterior approach to the hip joint. Then the incision is carried along the crest of the ilium for three inches and all the muscles are separated from the ilium subperiosteally. This brings one directly over the acetabulum and the head of the femur and allows a complete view of the hip joint. The hip joint is opened from the acetabulum down to the neck and the capsule pushed back from the head. Then enough of the head is removed to allow for the correction of the abduction and for the flexion deformity to be fully corrected. The acetabulum is cleaned out so that the head will fit securely into it and two bony surfaces are in apposition.

In the third group of cases the same incision is used. The top of the trochanter is placed into the acetabulum and the operator endeavors to make a stable joint. In the procedure the acetabulum is cleaned out and sufficient of the top of the trochanter cut off to get down to the bone. It is equally important not to remove too much of the trochanter on account of the necessity for a solid apposition.

In conclusion the authors state: The best result in such a destructive process as tuberculosis is firm ankylosis, and in order to prevent the recurrence of symptoms in adult life, this should be the aim of treatment.

The correction of deformity by means of osteotomy below the joint should not be done in cases where there is an unstable joint on account of recurrence of the deformity and on account of continued symptoms.

When there is motion in the joint, which is evidently the cause of symptoms, the deformity should be corrected within the hip joint and arthrodosis performed for stabiity of the joint.

An Operation for Tuberculosis of the Wrist. LEONARD W. ELY, San Francisco. *Journal of the American Medical Association,* December 18, 1920.

This operation necessitates cutting a groove in the radius and the third metacarpal and transplanting into it a graft from the tibia. The result is said to be a useful hand, possessing as much rotation as before the operation, and with excellent power in the fingers and thumb.

Treatment of Fracture of the Femur. KELLOGG SPEED, Chicago. *Archives of Surgery,* January, 1921.

The author quoting the results of various treatments from the study of cases reported by Nis, Martin, Estes and the records of the Cook County Hospital, Chicago, together with his own experience, draws the following conclusions:

1. Because there is no accepted American standard of results after fracture of the femur, there is no American standard of treatment.

2. A large percentage of the fractured femurs are cared for by the first physician that sees them; specialists are not employed to direct treatment.

3. There is not sufficient effort put forth to use abduction or suspension traction methods, as obtained by the Hodgen or Thomas splint in fractures of the shaft, which may allow knee motion during the course of bone repair without disturbing the extension.

4. Portable roentgen-ray outfits should be furnished in all hospitals treating fractures of the femur, so that results in the course of treatment can be checked as frequently as desired.

5. There have been too many operations performed on fractured femurs by inexperienced operators, and without proper indication.

6. Very little attention is given to massage and electrical stimulation of muscles during bone repair and still less is given to after-treatment, so that many patients are permitted to bear weight on soft callus. Disability results. Walking calipers are little used.

The remedies suggested are:

(a) Every patient with fracture of the femur should be directed to a hospital for roentgen-ray examination, correct treatment by any of the accepted methods, and after--treatment when cured. This includes fitting the patient with a walking caliper as soon as he is ambulatory or on his discharge from the hospital.

(b) Because fracture tables offer good means of securing reduction and an easy method of external splinting by plaster of Paris, every hospital receiving cases of fracture of the femur should possess a fracture or orthopedic table. Careful records should be kept in accordance with fracture record sheet, such as has been compiled by the American Surgical Association, so that a large number of average results can be grouped, that treatment looking toward the ideal may be worked out.

Precautions Necessary in the Selection of a Donor for Blood Transfusion. LESTER J. UNGER, New York. *Journal of the American Medical Association,* January 1, 1921.

Unger considers it unsafe to perform a transfusion relying simply on the fact that donor and patient are of the same group. Preliminary to transfusion, the blood of every patient should be grouped and then tested directly against that of the prospective donor. All individuals may be divided broadly into four main groups. These groups are established by the presence of two "chief" agglutinins in the serums and receptors for these agglutinins in the cells. Besides "chief" agglutinins, "minor" agglutinins have been demonstrated. Ninety-seven per cent. of adults have agglutinins in their serum. They are, however, present in 3 per cent. of new-born infants. Only 25 per cent. of new-born infants have cells that can be agglutinated, as compared to 50 per cent. among adults. The full quota of agglutinins and receptors is required between the third and fourth years of life. Incompatability between the blood of a mother and her new-born infant occasionally occurs. It is unsafe, therefore, to omit testing the blood preliminary to transfusion, even though the mother should act as donor. It is not advisable indiscrimintaely to use the so-called "universal donor," as severe reactions have been observed following the use of donors of Group IV for patients of other groups. The rouleaux-formation substance, even though acting on the donor's cells, is apparently harmless, and no untoward results have been seen following such transfusions.

Treatment of Acute Tetanus. Report of a Successful Case. ROBERT A. KILDUFFE AND W. B. MCKENNA, Pittsburgh. *Journal of the American Medical Association,* January 1, 1921.

This report derives its interest from the successful result obtained in a well-marked and typical example of acute

tetanus in which the beginning of the treatment was delayed. The trauma was sustained September 9th. The wound received hospital treatment, but a prophylactic injection of tetanus antitoxin was not administered. Eight days after the original injury, the patient was conscious of pain in the jaws and arms, and some slight stiffness of the jaws, which became progressively worse. He consulted a physician and received some medicine which gave no relief. September 20th he came under the care of the authors. Immediately on admission, the patient was given 10,000 units of antitoxin —all that was on hand. A few hours later he became extremely rigid, the jaws tightly clenched, and a slight retraction of the neck was noticed, though typical bowing of the body as a whole did not occur. He complained bitterly of pain. The wound, after having been thoroughly cleansed and after drainage was established, was kept wet with a constant hydrogen peroxid drip. Anaerobic cultures gave a growth of typical tetanus bacilli of classic shape. Five hours after admission the patient received 20,000 units of antitoxin intravenously. He was also given 40 grains of chlorbutanol by rectal injection, every four hours for two days. The antitoxin treatment was entirely intravenous. A total of 140,000 units was given during six days of treatment. The patient was discharged October 11th, perfectly well, except for some muscular aching in the limbs comparable to that found after severe or unaccustomed muscuar exercise, the abdominal muscles still being somewhat rigid.

The Pathology of Gunshot Wounds of the Spinal Cord. WILLIAM THORBURN, Manchester, England. *The British Journal of Surgery,* October, 1920.

The author, using the War Office Collection of injuries of the spine and spinal cord now lodged in the Royal College of Surgeons, and nearly one hundred wet specimens dissected, mounted, described and illustrated, classifies wounds of the spinal cord under obvious headings.

Considering the clinical aspects and post-mortem findings of 21 cases the writer lays down the following general propositions:

Gunshot injury of the spinal cord may be due to:

1. The direct impact of a missile, which may either penetrate it completely, or remain embedded in it, and which is liable to be accompanied by fragments of clothing, and especially of bone.

2. The indirect impact of fragments of bone, which again may penetrate completely, may remain embedded, or may recoil towards the positions from which they were dislodged, although such recoil is far less common and less obvious than in fractures of the verebral bodies as seen in civil life.

3. Contusion by: (a) Foreign bodies which enter the spinal canal but do not penetrate the theca; (b) Displaced fragments of bone protruding slightly into the vertebral canal; (c) Displacement of the soft parts only, or, rarely, subluxation of the bones—the widely-spread divulsive or "explosive" action of a missile passing by at a high velocity.

In all cases the cord is liable to present mechanical destruction and hemorrhage extending widely beyond the area of apparent injury, and affecting especially the grey matter of the anterior cornua, where it produces long spindle-shaped areas of destruction. Such extension of hemorrhage is more widely spread where the missile is of higher velocity.

In the case of direct impact by foreign bodies, septic meningitis will generally ensue, but such meningitis is less common when impact is due only to fragments of displaced bone. It is generally absent in contusions of all forms, and the untorn dura matter is highly resistant to infections.

Meningitis tends strongly to extend upwards rather than downwards, and is usually continuous, but may spread unobstrusively along the membranes, to blaze up at remote points.

Hemorrhage sufficient to cause serious compression is very rare, but it is usually present in such quantities that, should life be prolonged, it may readily give rise to well-defined cicatrices, which will tend to assume the annular and constricting type often found at operation.

The Influence of the Great War on Modern Surgery. Introductory Remarks at the Opening of the Surgical Section of the South African Medical Congress Held at Durban, October 4, 1920. CHARLES F. M. SAINT, Capetown, S. A. *The Lancet,* December 4, 1920.

Summarizing his address the speaker draws the following conclusions relative to beneficial influences of the war on modern surgery:

1. The chief benefits arising from popularization of already existing procedures are blood transfusion, nitrous oxide-and-oxygen anesthesia, bone and nerve surgery, and orthopedic constructive work. Though bone surgery has been merely referred to, mention must be made of the Thomas splint, which achieved a well-earned and well-deserved popularity.

2. Among "rebirths" might be included a considerable portion of the present views of shock, the ligature of the bleeding point in arrest of hemorrhage, secondary suture of wounds, and excision of wounds and primary suture.

3. Finally, of "new discoveries and their applications" one has to refer to bipp, flavine, ambrine, and the calipers employed for extension in cases of fracture.

It will be readily seen that the chief benefits in civil practice attributable to war surgery are intimately associated with that branch of civil surgery which is comparable to that of war—viz., injury, in its various relationships.

The Results of Wound Excision, with Suggestions as to Improvements and Alternative Methods. MARTIN B. TINKER, Ithaca, N. Y. *The Military Surgeon,* December, 1920.

The method advocated by the author over ten years ago and used during the World War is described as follows:

"First. Pack the wound with tampons of sterile cotton or gauze saturated with sterilized oil.

"Second. Scrub the surrounding skin thoroughly and prepare as for aseptic operation. The oiled tampon and packing will prevent the bacteria which surely contaminate the scrub water, from penetrating into the wound.

"Third. After scrubbing thoroughly, and the use of antiseptic solutions for the surrounding skin, the oiled tampons should be removed. The oil can be removed by means of ether, gasoline or benzine swabs. The badly lacerated tissue should then be thoroughly swabbed with some powerful, certain germicide. It does not matter especially what germicide is used. Harrington's solution, pure carbolic acid, strong solutions of formalin may be used. The wound should be thoroughly swabbed and an effort made to reach the bottom of every pocket and to work the disinfectant well into the ragged and bruised tissue. Only important structures, such as main vessels or nerves should be avoided.

"Fourth. With knife or scissors, excise tissues damaged by injury or the germicide solution. It is of advantage to use a tourniquet during incision of damaged tissue, otherwise free flow of blood is apt to obscure our field and prevent thorough work.

"Fifth. The wound can usually be closed safely as an ordinary clean incised wound without drainage; for if our work has been thorough we are dealing with healthy tissue of good vitality."

Failure to obtain good results when possible to give the wound early and suitable attention are attributed by the writer to:

"First. Incomplete excision of damaged and infected tissues. This was evident from the presence of fragments of projectile of considerable size in the wounds, pieces of clothing or, most frequent of all, infection of bone which kept up prolonged suppuration.

"Second. Apparently unnecessarily extensive excision attended by loss of function.

"Third. The contamination of the clean cut areas of the wound during the excision from the infected material which was being removed.

"Fourth. Perhaps the most important cause of failure was imperfect knowledge of surgical anatomy. This led to the sacrifice of important blood supply, nerves and

tendons in some instances which seemed especially unfortunate."

To the general principles laid down above relative to wound excision the author recommends as adjuncts, staining of the tissues (the stain to be conbined with a strong disinfectant), constructive plastic measures at the time excision is undertaken and the Carrel-Dakin method when feasible.

Remarks on the Diagnosis of Acute Abdominal Diseases. ARTHUR H. BURGESS, Manchester, England. *The British Medical Journal,* December 11, 1920.

In two lectures the author discusses the diagnosis of acute abdominal crisis.

The general symptoms include:

1. Various degrees of shock or collapse.
2. Alterations in the frequency and character of the pulse.
3. Changes in the tempertaure.
4. Alterations in the type of respiration—"thoracic" type.
5. Other symptoms, such as a dry and furred condition of the tongue, hiccough, strangury, and tenesmus.

After calling attention among the above signs to the fact that the temperature and pulse are most unreliable and often misleading the author groups the local symptoms as follows:

1. Abdominal pain.
2. Cutaneous hyperalgesia ("viscero-sensory" reflex).
3. Tenderness, local and general.
4. Nausea, vomiting.
5. Muscular rigidity ("viscero-motor" reflex).
6. Abdominal distension.
7. Presence of free gas in the peritoneal cavity.
8. Presence of free fluid in the peritoneal cavity.
9. Local abdominal or pelvic swelling.
10. Certain changes ascertainable upon rectal examination.

In conclusion, surgical technique has now reached such a high level of efficiency that further improvement therein cannot be relied upon to better the statistical results of the surgical treatment of acute abdominal crisis; such can be obtained only by earlier diagnosis on the part of the general practitioner permitting the application of surgical treatment at an earlier stage. The time that has elapsed between the onset of the attack and the opening of the abdomen is the real deciding factor in the ultimate issue of the case—far more so than the skill of the individual surgeon. Too much time must not be expended in making a diagnosis; one should be contented with recognizing that a grave lession has occurred which is more likely to recover if surgically treated. The author speaking, he believes, for all surgeons, would rather meet in consultation the practitioner whose diagnosis, made in the early hours of the attack, is limited to "something gone seriously wrong in the belly," than he who, 48 hours later, can give a cut-and-dried and possibly perfectly correct description of what an operation will reveal.

Solitary Amebic Abscess of the Liver. Report of a Case Occurring Thirty Years After Residence in the Tropics. WILLIAM J. MALLORY, Washington, D. C., *Journal of the American Medical Association,* December 25, 1920.

Mallory reports a case which occurred thirty years after residence in the tropics, thus making it evident that amebic abscess of the liver occasionally occurs a great many years after the primary and single attack of amebic dysentery. Therefore amebic abscess of the liver should be remembered as a cause of obscure fevers.

Uterine Replacement by Extraperitoneal Round Ligament Fixation Combined With Intraabdominal Control. L. DARTIGUES, *Presse Medicale,* November 10, 1920.

The author uses a technique, combining abdominal exposure with shortening of the round ligaments in the inguinal regions. The patient is put in Trendelenburg position and a low transverse incision is made, the ends of the incision extending into the inguinal regions so as to expose the inguinal canals. This incision extends to the aponeurosis, a longitudinal right rectus incision then being made through the parietes. The uterus and adnexa are thus exposed and any necessary treatment applied. The uterus is then returned to normal position. The inguinal canals are then opened in the extremities of the transverse incision and the round ligaments are exposed. The peritoneal incision is now allowed to fall together partially and traction is made on the round ligaments. A large pack being put in the pouch of Douglas to keep the uterus up while this is being done. Fixation of the round ligaments is then made, anterior duplication being the selected procedure. The peritoneum is then closed. The inguinal canals sewed up in the usual manner and the skin then closed.

Artificial Impregnation—Essays in Tubal Insemination. ROBERT L. DICKINSON, Brooklyn, New York City. *American Journal of Obstetrics and Gynecology,* December, 1920.

After discussing the preliminaries and technic of artificial impregnation the author directs attention to the following objections:

1. The possibility of infection of the tube and peritoneum.
2. Old tubal disease may be lighted up anew. It may, for a tubo-uterine orifice never closes. For the present at least such cases should be avoided.
3. It is possible that all that injection of semen accomplishes is to open the tube, in which case other fluids would do as well, and antiseptics be safer as used by Stone and Bovee. Only tests can tell.
4. One can have no assurance that coitus subsequent to the treatment was not the real agent in procuring conception. This may be true and this is the reason that the veterinary surgeon can offer proofs which we cannot.
5. It fails with semen which is not vigorous. It was devised for just such cases and it has not helped so far.
6. The field is very limited because patients revolt at the idea, or give it one trial instead of half a dozen. They prefer laparatomy. All this is exact, but it does not relieve us of the responsibility of preventing the patient taking the greater risk should there be a simpler way, did we but have the will to face the distastefulness of working it out.

Dickinson summarizes as follows:—In women presenting histories or pelvic findings pointing to the sealed tube following milder types of salpingitis, entirely quiescent, injection into the uterine cavity of active semen produced no results in twelve instances. Strong pressure was not deemed warranted.

In women with no gonorrheal histories or findings, free from cervical inflammations and evident uterine, tubal or ovarian lesions or abnormalities, living semen of the poorer grades produced no results in nineteen patients. No infection followed except in one possible instance and that of mild type. Several of these received three trials.

With fairly normal pelvic organs and semen of good quality, five pregnancies followed and are believed to have been due to tubal insemination. The knee-chest posture, the curved pipete fitting the internal os and carried nearly to the fundus, injection into the tubes, horizontal rest, and repetition three to six times—these are considered important. Trial of this method may well precede resort to operation—save those done for external obstructions.

Some General Considerations Regarding Prostatectomy. J. T. GERAGHTY, Baltimore. *Southern Medical Journal,* January, 1921.

Indications for suprapubic prostectomy:

1. When a suprapubic cystostomy has been recently performed for drainage, the enucleation usually should be carried out through the suprapubic opening.
2. A previous perineal operation, or the presence of dense scar about the bulbous or membranous urethra.
3. Multiple small calculi, especially when associated with diverticula.
4. Where prostatic hypertrophy is complicated with a lesion of the spinal cord the danger of incontinence following prostatectomy will be very considerably lessened by suprapubic removal.
5. Where there is present a very large intravesical hypertrophy with great dilatation of the internal sphincter, suprapubic prostatectomy will give better functional results. In this type of case, frequently following perineal prostatectomy, there is a slight weakness of the sphincters with consequent annoying dribbling, which may persist for some months. In the vast majority of these cases, however, the incontinence, which is only slight, disappears. Where no

special indications exist for the perineal operation the suprapubic should be the method of choice.

6. Where it is impossible, because of ankylosis of the spine and hip to put the patient in the proper perineal position.

Some Indications for Perineal Prostatectomy:

1. In every old and feeble man, peritoneal prostatectomy seems to be preferred. This operation is attended with considerably less shock than the suprapubic operation which inherently causes greater disturbances than the perineal.

2. Small fibrous prostates should be removed perineally, as successful removal through the suprapubic route may be very difficult or almost impossible.

3. Patients with a great deal of abdominal fat should have the perineal operation rather than the suprapubic, because the fat does not resist infection well, and convalescence consequently may be protracted.

4. Where there is present a very large inguinal hernia the perineal operation seems definitely indicated.

5. Where there is present a localized area suspicious of carcinoma, better exposure of the involved part will be secured through the perineum, because cancer of the prostate nearly always occurs in the posterior lobe. In occasional cases it will be possible to excise completely the carcinoma without a complete radical operation. It is impossible, by the suprapubic route, to remove carcinoma involving the posterior lobe.

6. Repeated previous suprapubic operations are an indication for the opposite route.

End-Result of Tonsillectomy. JOHN A. VIETOR, New York. *Archives of Pediatrics,* December, 1920.

The author in this article gives a statistical report of 500 consecutive cases of tonsils and adenoids operated upon and their end-results—arrived at through a "follow-up Clinic" and an endeavor to see the cases at intervals for one post-operative year. Seventy-nine per cent. of the cases were actually followed for 5 1-2 months; 4.21 per cent. of the cases were lost track of.

The operation itself was performed in the operating room under a general anesthetic (nitrous oxide gas and ether) with the exception of only two cases, when a local anesthetic was used and the operation was performed by Dr. James P. Erskine, the consulting laryngologist. No operations were done in the out-patient department, as that procedure is considered unsafe and dangerous on account of subsequent bleeding and danger of infection in an open throat.

Technique. Since the fall of 1915 the tonsils have been enucleated by dissection with instruments instead of by the finger. The Rose position, combined with the Hitz mouth gag and the Pool and Kenyon aspirator, with a specially designed suction tip, is used in order to get the best exposure and protect the patient from aspiration of blood, mucus and pus. The tonsils are removed by the snare, and adenoids by the curette, followed by finger palpation to insure a perfectly clean nasopharynx. After operation, patients are put to bed and kept quiet, special observation being kept for any undue hemorrhage. If one day after operation the temperature is normal, patients are allowed up on doctor's order. Children are usually kept in bed a day longer than adults, and no throat irrigations or applications are employed on either as routine.

The author draws the following conclusions:

1. Tonsillectomy and adenoidectomy in well chosen cases, performed by general surgeons, in a general service, under proper conditions, show 97 per cent. symptomatically good results.

2. The complications arising either early or late are few and not severe in character.

3. The benefits arising both in simple cases and those in which tonsils act as a portal of entry, warrant their removal.

4. The dangers of the operation are almost nil, as shown by the fact that there were no deaths due directly or indirectly to the operation in this series of 500 consecutive cases.

Rhabdomyoma of the Nose. Report of a Case. GEORGE S. REITTER, Indianapolis. *Journal of the American Medical Association,* January 1, 1921.

Reitter reports an experience with a case which led him to believe that rhabdomyomas that have an abundance of the connective tissue elements will show partial, if not complete, retrogression when treated with heavy doses of radium. His patient was a girl, aged 14. As the father refused to consider any surgical procedure, an attempt was made to reduce the tumor with radium. Only the gamma rays were used. Three hundred milligrams of radium element, screened with 3 mm. of lead and 2 mm. of rubber, at a distance of 2 cm., a total of 6,500 milligram-hours, were applied to four areas, which completely covered the surface of the tumor. Microscopically, no change in the tumor was noted, except for a slight transitory erythema that lasted for three days. About three weeks later the tumor showed a reduction of about an inch in the outside circumference.

Acute Mastoiditis—Indications for Operation. GEORGE MORRISON COATES, Philadelphia. *The Therapeutic Gazette,* November 15, 1920.

The author discusses each of the usual points of diagnosis and comments on their relative value.

In typical case one expects to find:

1. More often a child than an adult.

2. A history of predisposing cause (cold, measles, scarlet fever, bathing).

3. A history of pain, ear-ache, and aural discharge of greater or less duration.

4. Redness, edema or fluctuation over mastoid process obliterating, the temporo-auricular crease.

5. An auricle protruding, wing-like, from the head.

6. Tenderness over the entire mastoid process, or over certain points—e. g., the antrum, the mastoid emissary vein, or the tip.

7. Sagging of the postero-superior wall of the external auditory canal.

8. The membrana tympani red, buldging, or perforated.

9. Discharge of pus through the perforation, or if unperforated, pus in the middle-ear cavity.

10. Impaired hearing of greater or less degree.

11. Tuning-fork tests suggestive of conductive deafness.

12. Fever of moderate degree, 100 to 102°, without marked fluctuation.

13. Pulse commensurate with the fever.

14. Negative eye grounds.

15. Organism isolated from aural discharge, usually streptococcus viridans or hemolyticus, or pneumococcus.

16. White blood count increased to 12,000 or 15,000.

17. *X*-ray showing a cloudy mastoid indicating fluid or destruction of cell walls.

18. Any evidence of intracranial complication.

After reviewing each of the diagnostic points the author concludes that up to the present time there is no single diagnostic factor which is a positive indication for operation—and that such surgical procedure can be undertaken only when a combination of positive points is present.

The Gangrenous Processes in Ludwig's Angina. (Les processus gangreneuse, dans l'angine de Ludwig)—E. L. REYRE, *Press Medicale,* November 3, 1920.

The author prefers to consider Ludwig's angina as a gangrene, analogous to the gangrene seen in the war, rather than a phlegmon. It is provoked in reality by anaerobic bacteria, causing a local gangrene and often complicated by a fatal toxemia. Local inflammatory changes may also be present. The generalized toxemia may be very severe and out of proportion to the local condition, as it frequently is in any gangrenous process.

As rapid an intervention as is possible is desirable to reduce the gravity of the infection. A horizontal submaxillary or a median vertical incision may be used; two parallel paramedian vertical incisions are also used. One must not wait for the appearance of evident symptoms. Late incisions are only effectual in median subhyoid local phlegmons, not in true Ludwig's angina. General anesthesia is inadvisable because of the very marked and rapid reaction the patient has to any of them. Very little pain is felt because of the marked toxemia, therefore no anesthesia is advisable if combined with a short operation. The mylohoid should be divided in the median line. Digital cleansing is better than ordinary tube drainage; Dakin's solution is also very good, giving both mechancial washing and bactericidal effect in the after-treatment.

Pleural Empyema with Diphtheria Bacilli. Waldemar Goldsmith. *Wiener Klinsche Wochenschrift,* September, 16, 1920.

Diphtheria bacilli cling generally to the diphtheric membrane, and very seldom spread beyond it.

The author describes a case in which in the pus of empyema—(preceded by a probable diphtheric affection of the nose) diphtheria bacilli were found.

A three year old girl was brought to the Clinic of Surgery of Prof. Eiselsberg, from the Clinic of Pediatrics on the 23rd of April, 1920, with the diagnosis: Mongoloid, Pneumonia, Empyema lateralis sinistra. In the previous history is mentioned a purulent thick discharge from the nose, the bacteriologic examination of which gave a negative result to diphtheria; however, 2000 A. E. serum was injected on the 9th of April. On the 14th of April pneumonia set in on the left side; and on the 20th, pleuritis. On the 23rd, exploration discovered abundant, thin pus.

April 23rd, temperature, 37.5° c.; pulse, 140. Puncture with trocar drainage. After 36 hours patient died.

Deductions:—Suppurating lobar pneumonia; empyema thoracis. In the pus of the empyema streptococci and diphtheria bacilli; in culture: diphtheria bacilli.

Book Reviews

The Difficulties and Emergencies of Obstetric Practice. Comyns Berkley, M.A., M.D., M.C., Cantab, F.R.C.P., Lond., M.R.C.S., Eng. Obstetric and Gynecological Surgeon to the Middlesex Hospital; Surgeon to Inpatients, Chelsea Hospital for Women; Senior Obstetric Surgeon, City of London Lying-In-Hospital; Gynecological Surgeon, Eltham and Mottingham Hospital, etc., etc., and Victor Bonney, M.S., M.D., B. Sc. Lond., F.R.C.S., Eng., M.R.C.P., Lond.; Assistant Obstetric and Gynecological Surgeon to the Middlesex Hospital; Lecturer on Practical Obstetrics, Middlesex Hospital Medical School; etc., etc. *Third Edition.* Royal Octavo; 781 pages; 309 illustrations. Philadelphia. P. Blakiston's Son & Co., 1921.

This attractive book concerns itself in no wise with normal pregnancy or uncomplicated delivery. It is, however, an admirably comprehensive work on all the complications, difficulties and emergencies that may arise in pregnancy, labor or in the newborn infant. It seems to us to be a very complete reference work and guide in the recognition and treatment of these difficulties and complications, unusual as well as common,—nutritional, medical, mental, surgical, dermatological and obstetrical. It is not merely a scientific array of, or discourse upon, such complications, but a textbook that deals with them in a very practical fashion, and made the more useful by a wealth of excellent original illustrations. The descriptive matter is terse and clear, the directions practical and sensible.

About 200 pages are devoted to various complications of pregnancy and to a chapter on "difficulties in the diagnosis of pregnancy". The next 500 pages deal with hemorrhage at various stages, with abnormalities, complications and accidents of labor and the puerperium, and with concise descriptions of obstetric operations. A chapter of about 40 pages deals with diseases, injuries and deformities of the new-born. Concerning depression of the cranial bones, the authors state that if this does not disappear and cannot be corrected by manual pressure "it should be rectified by an operation", but they fail to say that the simplest operation is to lift up the depressed bone with a sharp hook (tenaculum). Concerning the surgical treatment of congenital hypertrophic stenosis of the pylorus they say only that "the operation most commonly performed is dilatation of the pylorus through an opening in the stomach". Ramstedt's operation is thus not referred to.

In this edition, the result of considerable revision, there has been added a final chapter on "the feeding of infants", written by H. C. Cameron

Surgical Pathology and Morbid Anatomy. By Sir Anthony A. Bowlby, K.C.B., K.C.M.G., K.C.V.O., F.R.C.S., Surgeon in Ordinary to His Majesty the King, and Consulting Surgeon to St. Bartholomew's Hospital; President Royal College of Surgeons of England; and Sir Frederick W. Andrewes, M.D., F.R.S., Lecturer on Pathology in the University of London. *Seventh Edition.* Large Octavo: 636 pages; 210 illustrations. Philadelphia: P. Blakiston's Son & Co., 1920.

It is thirty-three years since Sir Anthony Bowlby's "Surgical Pathology" first appeared. In its successive editions, and especially in this one, that small work has been increased in size, not merely by the growth of the text but also by the enlargment of the format. In this issue it is still, however, a book of very convenient size to handle. Correspondingly, it is not, it seems to us, a comprehensive exposition of surgical pathology, although it covers a wide range of surgical diseases.

Three new sections appear in this edition, dealing, respectively, with *gas gangrene, shock* and *tetanus;* the old illustrations have been redrawn larger; and the text has been submitted to general revision. We have been interested to note that in this revision a scientific inaccuracy in the earlier editions has not been corrected. As before, the statement is made concerning bone abscesses: "Chronic abscess is never met with in the shafts, but always in the cancellous tissue of the epiphysial ends". Chronic bone abscesses, sometimes sterile, are met with in the shafts, usually in the medulla as a residum of a pyogenic coccal (osteomyelitis) or typhoid infection, or, sometimes in the cortex (e. g., typhoid abscess). Admitting this correction, there ought then also be revised the succeeding statement: "It is probable that almost all of these abscesses are of tuberculous origin...." (page 308).

The Anatomy of the Human Skeleton. By J. Ernest Frazer, F.R.C.S., Eng., Professor of Anatomy in the University of London and Lecturer in the Medical School of St. Mary's Hospital; Examiner in Anatomy for the University of London; Examiner in Anatomy for the Primary Fellowship of the Royal College of Surgeons of England; Formerly Examiner in Anatomy for the Conjoint Board of the Royal Colleges of Physicians and Surgeons. *Second Edition.* Quarto: 284 pages; 219 illustrations, many in colors. Philadelphia: P. Blakiston's Son & Co., 1920.

The thoughtful student of anatomy will find much interesting information in reading this work as supplemental to his "Gray" or "Piersol" and to his tissue studies. In this edition several new illustrations appear.

French-English Medical Dictionary. By Alfred Gordon, A.M., M.D., (Paris). Late Associate in Nervous and Mental Diseases, Jefferson Medical College; Late Examiner of the Insane, Philadelphia General Hospital; Neurologist to Mount Sinai, to Northwestern General and to the Douglass Memorial Hospitals; Fellow of the American College of Physicians, etc., etc. Octavo; 161 pages. Philadelphia: P. Blakiston's Son & Co., 1921.

The title of this book fairly indicates its contents. It gives the pronunciation and the English equivalent of French terms used in medicine.

France has contributed her full share to medical science. She is continuing this contribution, and in the current literature are many important articles, monographic treatises that have come, among other sources, from war-stimulated French studies in bacteriology, neurology, medicine, surgery. To those who would read these publications in the original—and scientific French is not at all difficult to understand—this dictionary ought to be very welcome. Dr. Gordon has done a useful thing in preparing it.

Eating to Live Long. By William Henry Porter, M.D., With an Introduction by Edwin F. Bowers, M.D. Duodecimo: 243 pages. Chicago: The Reilly & Lee Co., 1920.

Other things being equal, recovery and euphoria are not only dependent on a proper dietary before and after operation but are conditioned to a large degree in most cases by the ordinary habits of eating. The far-reaching importance of this statement can be visualized by the fact that

the surgeon is becoming more and more active in fields which were until lately regarded as exclusively the province of the internist. Therefore no surgeon can afford to ignore dietetics, but when beginning the study of this science in the light of recorded opinions he finds himself sorely perplexed by the contradictions of writers. Porter's book, bearing the endorsement on the coverslip of seven members of the profession prominent in medicine and surgery, informs the reader at once of this discrepancy in the following words: "What is more surprising, however, is that medical men, among them men who have won an enviable reputation as physiologists and clinicians, are almost equally at sea respecting the uses and proper selection of food. So conflicting has been their experience, so confusing their findings, that hardly any two modern authorities agree upon even the fundamentals of nutrition." Porter emphatically declares himself against the vegetarians because of the polymerism of the vegetable proteid molecule, which has to be changed into an isomeric form before it can be acted upon, whereas he believes the proteid molecule of animal derivation to be more readily digested, absorbed and assimilated because of its monomeric structure; and that vegetable foods "are much more prone to excite putrefactive fermentation in the alimentary canal" by reason of the exhaustion of available oxygen during transformation of the larger amount of carbohydrates present. Over against this Kellogg, the protagonist of the vegetarian system, in a recent paper covering thirty years experience in Battle Creek, quotes Tissot that vegetable proteins are only about half as prone to putrefy as animal proteins and claims that Torrey has recently demonstrated the same fact; also approving Paget's claim that the higher death rate from operations on persons dwelling in cities, compared with rural districts, as due to the larger ingestion of meat among urbanites. In chapter XI the lactovegetarians are given another jolt. The author is convinced that the eating of fruit especially in conjunction with meals is one of the most pernicious and reprehensible of dietetic follies. He believes that the extra acidity of the material makes it difficult for the alkaline juices of the intestine to neutralize the food pabulum with the consequence that the heat and moisture unite with the fermentative processes to break down the substances, thus favoring decomposition of the albuminous compounds and the development of the alkaloids of putrefaction; and that ailments such as headaches, neuralgia, neuritis, rheumatism, sciatica, lumbago, skin eruptions, even diabetes and Bright's disease have their origin "in nothing more or less complex than the injudicious use of fruit and fruit acids." The laxative action of fruit is regarded as due to abnormal fermentation of food stuffs in the alimentary canal. Apparently the author is unaware of the careful and thoroughly scientific work of Schmidt and Strasburger on the hormone-producing flora of the intestines in the matter of curing constipation; indeed, the reader is apprised that a liberal animal protein diet will overcome chronic constipation.

Why are equally earnest and successful practitioners so much at variance with one another on such an intensely practical matter? Most likely because we know so very little about the digestive functions dietetics is as yet much more of an art than a science and, secondly, because recovery is too readily assumed to be the result of a particular diet. It has been said that a normal life begins and ends on milk. Give a nursling cows' milk and as like as not it will keep the family awake all night but who ever heard an octogenarian bawl after partaking of it? Everytime Jones eats corned beef and cabbage in his own home he gets sallow and morose but if he eats it across the street, at his friend Smith's, he goes about his office the next day declaring this world to be a good place to live in. The caloric fetish, by its purely chemical viewpoint, is responsible for the lack of progress in dietetic science; it is roughly and rightly handled by the author. Those accustomed to careful objective study of the alimentary secretions are aware of the incessant variations in amount and quality even in apparently healthy persons and know that therefore other factors besides mere chemical interaction are at work which must be taken into account. The first is the important one of the varying bacteriolytic power of the upper half of the alimentary system. The second is the biologic fitness of the diet, which however, must include far more than the accessory food substance. Thirdly, is the difficult factor of reasonably gauging the degree of comminution, consistence and total bulk in accordance with the dynamic amplitude of the gastric muscle. Fourthly, pathological reactions after ingestion. Fifth, conditions in the colon. The reviewer's experience is similar to that of Bassler, that dietetic measures alone do not result in permanent removal of the intestinal toxemias. Sixth, the psychic environment during ingestion, considered in its widest sense; Pavlow's work has by no means exhausted the subject. So little is known concerning these factors that it can be seen why there is so much divergence in the writings and that dietetic science is only in the making. Sweets are curtly labeled by the author as life-shorteners, which is certainly true in many instances. On the other hand, the propaganda against sugar should not be pushed too far. The industrial worker of the ptotic type does not thrive well when cut off from sugar. A moderate pre-operative alimentary hyperglycemia appears to minimize the shock and to prevent the acidosis accompanying surgical procedures. Chapter XXI deserves to be read by every practitioner because the alcohol question is discussed in the light of experience and in a thoroughly scientific manner. Since the late emergency there is a noticeable tendency of a too free recourse to the "blessed morphin" in casualty practice. Of course when shock is being maintained by pain it is the only logical remedy. Its ultimately deteriorating action in the psychic spheres is noticeable in proportion as the pain element was in abeyance. But it is just in these cases that the primary stimulation of alcohol followed by the block action on the nerve endings, including the nerves of muscular sense, its action on the peripheral vasomotor nerves and mild central anesthesia, commend it to the prudent practitioner. The word prudent is used advisedly because alcohol has been abused in medicine and surgery by overdosage.

Since the science of dietetics is only in its infancy owing to the complexity of the factors involved, the practitioner must still hold fast to the formula of the ancients, that the methodic of adequate nutrition is an individual problem which can be evidenced only by vital and social efficiency and the joy of living. A book such as the one under review is helpful, it should be read, re-read and pondered, not indeed as a definitive treatise, but as the testimony of an experienced clinician. A. V. WENDEL.

Orthopedics for Practitioners. An Introduction to the Practical Treatment of the Commoner Deformities. By PAUL BERNARD ROTH, M.B., CH.B. (Aberd.), F.R.C.S (Eng.), Senior Surgeon, and with Charge of Orthopedic Cases, Kensington General Hospital; Member of Orthopedic Section, Royal Society of Medicine; Late Surgeon, City of London Military Hospital; Senior Orthopedic Clinical Assistant, London Hospital, etc. Small octavo; 190 pages; 57 illustrations. London: EDWARD ARNOLD, 1020. New York: LONGMANS, GREEN & Co.

In this work the author has condensed a great deal of practical information in small compass. It deals with the skeletal deformities that come under orthopedic treatment, tuberculosis of the spine and the joints, amputation stumps, and some of the affections of the hands and feet. There are chapters also discussing briefly the general principles of treatment in fractures, dislocations and other joint injuries, peripheral nerve injuries and old gunshot injuries. The author uses plaster of Paris very little, but describes the employment of various splints, especially Thomas'. In the treatment of fractures he enthusiastically supports the method of Lucas-Championnière; and he urges exact reposition, recommending open operation to accomplish this when necessary. He condemns "rapid correction" efforts (Abbot) in spinal curvature.

While the information contained in this book will be found in larger works on orthopedic and general surgery, it is presented here in the form of a convenient manual that ought to be useful to the novitiate in this specialty. It is a practical introduction to the subject—fundamental rather than merely elementary.